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ABSTRACT

Ghana was among the first sub-Saharan African countries to adopt a population policy, in 1969. In this paper, individual women are linked to the characteristics of the nearest pharmacy, health facility and source of family planning to assess the relative importance of socioeconomic background and the availability, price and quality of family planning services on contraceptive use and fertility. The results suggest that raising levels of female schooling will also raise contraceptive use and lower fertility, particularly in rural areas. Distance to services remains a binding constraint for contraceptive use among the entire sample and for the urban sample of women. The number of methods offered at a health facility is associated with lower fertility but has no apparent relation with current contraceptive use. The presence of admission fees at the nearest health facilities has no relation with contraceptive use, while the availability of spermicides raises use. Service characteristics have little relation with fertility, leading to the suspicion that some of the services are placed according to patterns of demand. Measures of the quality of the services show no consistent effect in the demand for contraception or on fertility. (Author/JE)

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LSMS

Living Standards
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Working Paper No. 111

Contraceptive Use in Ghana

The Role of Service Availability, Quality, and Price

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Contraceptive Use in Ghana

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LSMS Working Paper
Number 111

Contraceptive Use in Ghana

The Role of Service Availability, Quality, and Price

Raylynn Oliver

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Washington, D.C.

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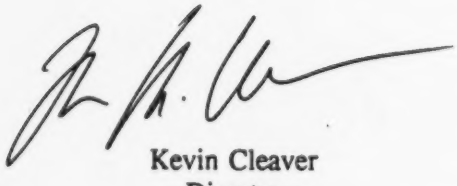
Foreword

Rates of population growth and levels of fertility in Sub-Saharan Africa are among the highest in the world and exacerbate many development problems. The success of policies to slow rapid population growth and raise the quality of life will depend on an understanding of the factors that lead to a high demand for children and to low contraceptive use. Among the most important of these are female education, household income and the availability, price and quality of contraceptive services. Until recently, an adequate assessment of the impact of family planning service characteristics has been hampered by the non-availability of data on services that could be linked to the behavior of individual women. However, recent advances in data collection — notably the collection of data on the service environment faced by the respondents in household surveys — have now made possible such an assessment. This paper examines the relative impact of women's schooling, household income, and contraceptive availability, price and quality, on the demand for family planning and, ultimately, on fertility in Ghana, using data from the 1988-89 Ghana Living Standards Survey (GLSS). The results indicate the importance of female schooling, access to services and the price of services of private providers in determining contraceptive use in Ghana.

This paper is one of several products of the World Bank research project on "The Economic and Policy Determinants of Fertility in Sub-Saharan Africa", sponsored by the Poverty and Human Resources Division of the Africa Technical Department (AFTHR) and managed by Martha Ainsworth, principal investigator. It is part of a broader research effort in the Poverty and Human Resources Division of the Policy Research Department (PRDPH) that examines the role of human resource in economic development. The Ghana Living Standards Survey is one of several Living Standards Measurement Study (LSMS) household surveys implemented in developing countries with the assistance of the World Bank.



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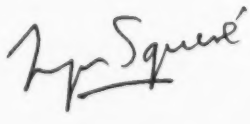

Lyn Squire
Director
Policy Research Department

Abstract

Ghana was among the first sub-Saharan African countries to adopt a population policy, in 1969. Today, the mean distance to a source of family planning is about 3 miles, including public and private health facilities and private pharmacies. These services also offer several modern contraceptive methods, for a fee. Secondary enrollment rates for girls have risen to 31 percent, among the highest in sub-Saharan Africa. However, population is still growing rapidly (3.4 percent per year), fertility is high (total fertility rate of 6.4) and contraceptive use is low (5.7 percent for modern methods, 33 percent for traditional methods). In this paper, individual women are linked to the characteristics of the nearest pharmacy, health facility and source of family planning to assess the relative importance of socioeconomic background and the availability, price and quality of family planning services on contraceptive use and fertility. The source of data is the 1988-89 Ghana Living Standards Survey (GLSS).

The results suggest that raising levels of female schooling will also raise contraceptive use and lower fertility, particularly in rural areas. Distance to services remains a binding constraint for contraceptive use among the entire sample and for the urban sample of women; the distance to services in rural areas is still high, while in urban areas where demand for smaller families is greater, distance is a binding constraint even though average distances are smaller. The number of methods offered at a health facility is associated with lower fertility but has no apparent relation with current contraceptive use. The presence of admission fees at the nearest health facilities has no relation with contraceptive use, while the availability of spermicides raises use. Service characteristics have little relation with fertility and sometimes in unexpected directions, leading to the suspicion that some of the services are placed according to patterns of demand. Measures of the quality of services show no consistent effect on the demand for contraception or on fertility. This may be because of low variation in quality, because the important quality aspects were not measured by the GLSS, or because other factors, such as distance and price, are the binding constraints to increased use of modern methods at present.

Acknowledgments

This paper was sponsored by the research project on "The Economic and Policy Determinants of Fertility in Sub-Saharan Africa," managed by the Poverty and Human Resources Division, Policy Research Department (PRDPH) and sponsored by the Africa Technical Department, Poverty and Human Resources Division (AFTHR). The opinions expressed in this paper are those of the author and do not necessarily reflect the policy of the World Bank or its members. The author gratefully acknowledges guidance and suggestions from Martha Ainsworth and Julie Anderson Schaffner and useful comments from Susan Cochrane, Andrew Foster, Elizabeth Frankenburg, Andrew Foster, Paul Glewwe, Daniel Kress, and Shiyan Chao.

I. Introduction

High fertility in Sub-Saharan Africa continues to generate high rates of population growth. Population in the region grew at an annual average rate of 3.1 percent from 1980 to 1991. Rapid childbearing exacerbates low levels of maternal and child health. In order to mitigate these problems and to promote long-run development objectives, many African countries have adopted population policies to lower levels of fertility by raising contraceptive use. The principal strategy used to date has been to expand the access of women to family planning services.

Worldwide, where family planning services are more widely available, contraceptive use is higher and women have fewer children. However, improved availability of contraceptives does not guarantee that they will be used or that fertility will decline. Women must demand contraceptives, and their demand for contraception is derived from their demand for children. Van de Walle and Foster (1990) find that the high fertility rates prevailing in Sub-Saharan Africa reflect high demand for children. This demand is determined by the costs and benefits associated with the birth of additional children and the cost of preventing that birth. If the demand for children is sufficiently inelastic to contraceptive availability and price, provision of contraceptives may have no impact on fertility outcomes. In this case, other factors that lower the demand for children need to be identified and targeted in order to lower fertility. An understanding of the relative importance of socio-economic variables and family planning availability in determining contraceptive use is crucial to meeting the policy objectives of lower fertility and improved maternal and child health in Sub-Saharan Africa.

In 1969, Ghana was one of the first countries in Sub-Saharan Africa to adopt a population policy with the expressed objective of reducing population growth. Now family planning is widely accepted and legal obstacles are few, yet contraceptive use remains low and unmet need is reported to be high.[1] This paper examines the role of the quality and availability of family planning services on contraceptive use and on fertility. The relative impact of distance to price and quality of family planning services on contraceptive use is compared to that of women's schooling and other socioeconomic characteristics on contraceptive use. This paper advances the literature by incorporating a variety of exogenous indicators of the quality of family planning services, to answer the question: Which, if any, of the quality characteristics affect contraceptive use?[2] Understanding the relative importance of the characteristics of the woman, including her level of completed schooling

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1. World Development Report, 1993, reports that in Ghana, 13 percent of women of childbearing age use some form of contraception available through family planning services.

2. Self-reported availability measures such as knowledge of or distance to family planning source, are inherently endogenous; a woman who has used family planning is more likely to know of the sources than a woman who has not, and the former is more likely to report the services actually used, rather than those available.

and the characteristics of the nearest facility will be useful: 1) in targeting programs to those women most likely to use contraceptives; 2) in developing family planning service provision strategy; and 3) in allocating government funds among the various public programs that have an effect on contraceptive use and fertility decisions.

Section II of this paper presents a theoretical economic model of the decision to use contraception that includes a description of the costs and benefits that are likely to have an impact on the decision. Section III discusses the history of family planning policy and services in Ghana. Trends in fertility levels, contraceptive use, female schooling and child health are also described. The empirical issues are discussed in Section IV. Estimation results are presented and interpreted in Section V. Section VI concludes by discussing the policy implications of the analysis.

II. Economic Model of Contraceptive Use

The economic model of contraceptive use that forms the basis of this study is an extension of the standard economic model of fertility decisions. Utility maximizing models of fertility decisions were developed by Becker (1960) and Leibenstein (1957). In these models, the demand for children is a function of the economic contribution of children to the household, the cost of children including the value of the woman's time, and exogenous household income. A woman's decision to use contraception is postulated to be a function of these variables and the cost of contraceptives.

The woman maximizes her utility, U, that is a function of the number of children, C, consumption of market goods, X, and leisure, L, and her tastes, μ. Children require inputs of the woman's time, T_C and market goods, X_C. The allocation of the woman's time to market activities, T_M, to child rearing and to leisure may not exceed her total time endowment, Ω. Utility is maximized subject to a full income budget constraint and the time allocation constraint.

$$\max U = U(C, X, L; \mu) \tag{1}$$

$$T_M + CT_C + L = \Omega \tag{2}$$

$$p_X(X + CX_C) + p_{FP}FP = wT_M + Y \tag{3}$$

The demand for children can then be expressed as a function of the exogenous variables: prices, p_{FP}, and p_X, wages, w, and exogenous household income, Y.

$$C^* = C(p_{FP}, p_X, w, Y; \mu) \tag{4}$$

The cost of children includes the value of the mother's time (Ben-Porath, 1973), the cost of housing and food, and the availability of school and health facilities (DeTray, 1973). The cost of children also varies depending on the "quality" demanded. Beyond the minimum necessary expenditure, additional investment can be made in medical care, schooling, and more expensive food.

In addition to the social and emotional benefits, children may represent an important economic asset. The economic contribution of children depends on the child's survival, on whether wood and water need to be fetched, on the need for farm labor in the household, and on the prevailing wage for child labor (Delancey, 1988). Children are also valued especially by women as old age security (Cain, 1983). Resources available to the household can be measured by expenditure, durable good ownership, housing characteristics or the earning potential of the household head.

The costs of limiting fertility, using contraception, vary from woman to woman and from area to area. These costs include the time and money to travel to and from the facility,

waiting time, and the price of the methods and consultations. The quality of services may also be an important determinant of demand for contraception, as it has been found to be in the demand for health and schooling.[3] Contraceptive use may not be responsive to availability if women are not comfortable with the personnel or the methods that are offered. The psychic cost of contraception in the face of spousal and familial opposition may vary across religions and ethnic groups.[4] Tastes are also expected to vary with religion and ethnic group.

The demand for contraception is derived from the demand for children. A woman chooses an amount of family planning to limit her fertility to the number of children demanded. It is, therefore, a function of the same exogenous prices listed in Equation 4.

Consider the expected impact of the exogenous variables in the demand for contraception. The price of contraceptives is expected to have a negative effect; the substitution effect is negative, the income effect depends on the shape of the utility function but the overall effect is expected to be negative. An increase in the price of other goods will raise the demand for children as women substitute away from purchased consumption goods to children. However, it will also leave less income to be spent on all inputs to the utility function and increase the cost of producing children thus counteracting the substitution effect and lowering the demand for children. The presumption is usually made that the substitution effect is smaller than the combined negative income effect and own-price effect and that the net effect of increasing the price of other goods on the demand for children will be negative. Thus we expect a positive effect on the demand for contraceptives.

The effect of a woman's wage on contraceptive use is theoretically indeterminant. It can also be decomposed into an income and a substitution effect. An increase in the woman's wage increases the cost of producing children. The "own-price" substitution effect on the demand for children is unambiguously negative. However, an increase in women's wages can also raise her income. The effect of the increase in income on the demand for children will depend on whether or not children are normal goods. The net effect is usually found to be negative. The presumed effect of woman's wage on the demand for contraceptives is therefore positive.

Holding women's wage and prices constant, an increase in exogenous income is expected to raise the demand for children and therefore lower the demand for contraception. Empirical work, however, often shows that increases in income lower demand for children (and would therefore raise the demand for contraception). There is a large literature

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3. Mwabu and others (1993), report this to be true in household level health care decisions in Kenya. Lavy and Germain (1993), find quality to affect the demand and willingness to pay for health care in Ghana.

4. Ainsworth (1985), describes in detail the various economic and psychic costs that acceptance and successful use of contraception entails.

addressing this debate. One theory is that as income increases, investments in children increase, children become "more expensive" and demand for children decreases.[5]

The signs of the expected effects of changes in the exogenous variables on the demand for contraception are summarized in Equation 5.

$$FP^* = FP(p_{FP}, p_X, w, Y; \mu) \qquad (5)$$

(signs: $-$ $+$ $+$ $-$)

The only empirical analysis of the determinants of contraceptive use in Sub-Saharan Africa that includes service characteristics is the work done by Guilkey and Cochrane on Zimbabwe and Tunisia (Guilkey and Cochrane, 1992, and Cochrane and Guilkey, 1992). In these papers, fertility intentions, (desired number of children), are estimated using the number of births and child deaths experienced by the women. The predicted intentions are then used along with women's characteristics and measures of family planning access to estimate use of modern and traditional methods of birth control. They find only a limited role for the variables measuring access to family planning and no significant effect of quality of services. Presence of a community-based distributor is found to increase the probability of using a modern method, and family planning advertisements are found to increase the probability that a woman wants to delay the birth of her next child. However, the measure of family planning message was reported by the women themselves and, therefore, endogenous. This study is able to use exogenous measures of family planning services.

5. Per child investments, both in goods and time, are not a choice variable in the model presented here.

III. Fertility and Family Planning in Ghana

In order to motivate the empirical specifications and interpret the results presented in Section IV, it is necessary to review the context within which fertility and contraceptive use decisions are being made. This section outlines the current levels of fertility and describes the history of family planning policy and services in Ghana. Descriptive statistics of facility characteristics and bivariate analysis of knowledge and use of contraceptives are also presented.

Ghana's crude birth rate of 45 per 1000 women, annual population growth rate of 3.4 percent, and total fertility rate of 6.4 place Ghana near the average for Sub-Saharan African countries on all three measures, but substantially higher than other developing countries. Table I presents these figures for Ghana and averages for Sub-Saharan Africa, Low to Middle Income countries and High Income Countries.

Family Planning Policy

In 1969 Ghana became one of the first Sub-Saharan African countries to adopt an explicit population policy. The policy, laid out in the document *Population Planning for National Progress and Prosperity*, describes the negative effects of unregulated population growth for individual and family welfare and for the nation's efforts at social and economic development (Republic of Ghana, 1969). The policy set specific goals, including the reduction of the annual population growth rate to 1.7 percent by the year 2000 from nearly 3 percent in 1969, and called for a multi-sectoral approach involving all government ministries to achieve that objective.

Formal family planning services were introduced in Ghana prior to the adoption of the policy in 1969. In 1961 the Christian Council of Ghana established a Family Advice Center in Accra to provide married couples with advice on family planning and responsible parenthood. Physicians concerned with maternal morbidity and mortality formed the Planned Parenthood Association of Ghana (PPAG) to educate women on the benefits of using family planning and modern family planning services. Offices opened throughout the country starting in 1967. In response to the objectives of the 1969 policy, the Ghana National Family Planning Program (GNFFP) was established in 1970 and family planning services were brought into the health care delivery system.

More recently, the National Catholic Secretariat has begun teaching the Billings Ovulation method (based on changes in cervical mucus) at its Natural Family Planning Center located in Accra and in most of the sixty Catholic hospitals and clinics in the country. In 1986 the Ghana Social Marketing Program (GSMP) was established, with support from USAID, to increase accessibility. Commercial pharmaceutical shops are used as sales outlets and commercial marketing, advertising, promotion, distribution, and subsidies are provided in order to maximize the number of users (rather than to maximize profit). Pills, foaming tablets and condoms were included in the GSMP.

Table I. Population and Demographic Indicators

	Crude Birth Rate per 1000 pop.		Average Annual Population Growth (percent)		Total Fertility Rate	
	1965	1988	1965-80	1980-88	1985	1988
Ghana	47	45	2.2	3.4	6.8	6.3
Sub-Saharan Africa	48	47	2.7	3.2	6.6	6.7
Low & Middle Income	41	30	2.3	2.0	6.1	3.9
High Income	19	14	0.9	0.7	2.8	1.8

Source: World Development Report, 1990.

The long-standing policy and all the private sector activity have resulted in a very high degree of awareness of contraceptives and an openness among many Ghanaians to the idea of practicing contraception. Family planning services and contraceptives are more readily available in cities and towns in Ghana than in other West African countries. Pills can be purchased without prescription from pharmacies and small-scale drug vendors. The legal status of family planning is also very liberal. There is no prohibition against female sterilization, except that it must be performed by a physician. Abortions are legal for a broad range of medical, juridical (rape/incest), and socioeconomic reasons. The only restrictions are that the approval of the husband is required and that the abortion must be performed by a physician (Scribner, 1994).

In spite of high rates of knowledge of contraceptives and the fact that "there is no evidence of any really serious opposition to family planning on political or religious grounds within the country" (Owusu and others 1989), use remains low. Only 33 percent of all women 15 to 50 years of age currently use any family planning method with only 5.7 percent using a modern method of contraception (Ghana Living Standards Survey, 1998-89). Lack of financial resources has always been an obstacle to the expansion of family planning services in Ghana. The consistent political will necessary to successfully coordinate activities has at times been lacking as well. Family planning programs rely heavily on outside funds and private sector organization. Ghana has not conducted a wide-scale, mass media or distribution campaign like those in Malaysia or Thailand. However, posters encouraging small families can be seen in many public buildings and knowledge of family planning methods is high (83 percent). Distribution has been strongly biased toward urban areas due to financial constraints and the difficulties of transportation in rural areas.

Even though contraceptive use is low by international standards, Ghana has one of the highest contraceptive prevalence rates in Africa. The percent of married women using any

contraception is above 70 percent in most Western countries and around 40 percent throughout Asia. Among Sub-Saharan African countries, contraceptive prevalence (both modern and traditional methods) is highest in Zimbabwe (43 percent), Botswana (33 percent) and Kenya (27 percent). Contraceptive prevalence in most of the remaining Sub-Saharan African countries is below 10 percent.

Private organizations hoping to increase contraceptive prevalence in Ghana will be interested in understanding the relative importance of accessibility, quality of facility, and cost of family planning services in determining contraceptive use. As the Ghanaian government makes budget allocation decisions, it will also be interested in comparing the relative importance of family planning facilities and female schooling in increasing use of family planning. To illuminate the importance of these reinforcing effects, this study analyzes the determinants of contraceptive use within the context of the economic model presented in Section II.

Contraceptive Knowledge and Use

Knowledge of contraceptives is widespread among women who have had sexual relations. Knowledge, ever use, and current use of contraceptives, by method from the 1988-89 Ghana Living Standards Survey (GLSS) are presented in Table II. Eighty-three percent of women have heard of at least one traditional method and 82 percent of at least one modern method.[6] Abstinence and the pill are the most widely known methods. Rhythm, condoms, spermicide and injectables are all known by more than half of the women who have had sexual relations with a man. A relative or spouse is the most commonly cited source of knowledge about abstinence. Friends are the most common source of knowledge of all other traditional methods and of condoms and spermicide. Family planning clinics are cited as the source of knowledge of diaphragms, the pill, IUDs and injectables.

Ever use of contraception is much less common, but 51 percent of women have used at least one traditional method and 27 percent at least one modern method. The pattern of use follows closely the pattern of knowledge: Abstinence is the most commonly used method followed by rhythm, the pill, spermicide and withdrawal. Condoms are widely known but not often used. However, the strong resistance by men is fading as concern and awareness of AIDS increases.

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6. The GLSS collected knowledge and use data on six traditional methods: abstinence, withdrawal, rhythm, herbs/potions to drink, herbs/potions to insert and douche; and six modern methods: condom, the pill, IUD, injectable hormone (Depo-Provera), spermicide, diaphragm. No information was collected regarding female or male sterilization. Thus, some women who are using a modern method will not be so-counted in this analysis. Ross and others (1992) report that one sixth of the women using modern contraception in Ghana have been sterilized. Use of spermicide is more prevalent among modern users in Ghana than in other African countries. They were introduced as an important part of the USAID-sponsored social marketing program.

Table II. Knowledge and Use of Contraceptives by Method Among Women Who Have Commenced Sexual Relations

(n=2048)
(Percent of women)

Method	Has heard of method	Where Heard[a]	Has Used Method	Currently Uses Method	Where Obtained[a]
Abstinence	71	Rel/Spouse	36	22	..
Rhythm	51	Friend	26	15	..
Withdrawal	44	Friend	13	5	..
Herbs/Drink	43	Friend	4	0.9	..
Herbs/Insert	32	Friend	3	1	..
Douche	20	Friend	4	1.5	..
Any Traditional	**83**		**51**	**33[b]**	
Condom	66	Friend	8	1	Pharmacy
Spermicide	52	Friend	13	2	Pharmacy
Diaphragm	32	FP Clinic	0.8	0.4	Hospital
Pill	71	FP Clinic	16	2	Chemical Seller
IUD	27	FP Clinic	0.6	0.1	Hospital
Injection	51	FP Clinic	1.5	0.5	FP Clinic
Any Modern	**82**		**27**	**6**	

Source: Ghana Living Standards Survey, 1988-89.

a. Most common response given.
b. This figure does not equal the sum of the individual methods because 6.7 percent of the women report current use of two traditional methods and 1.4 percent use more than two traditional methods. Five women reported current use of more than one modern method.

One third of the women are currently using one of the traditional methods, mostly abstinence and rhythm.[7] Only 6 percent of women are currently using one of the six modern methods, of which, spermicide and the pill are the most common. The most commonly cited source is pharmacy or chemical seller for the three most common methods: spermicide, pill and condom.

7. Other traditional methods of controlling fertility were not included in the questionnaire. A list of traditional methods used in Uganda is provided in the appendix of Ntozi, (1993). Many of these methods are rituals or symbolic acts such as a woman wearing a cord around her waist when she wants to avoid conception. While these methods would not seem to be effective, it is possible that the cord signals to the man the woman's desire, and he may respond with some combination of rhythm and withdrawal. A woman practicing fertility control of this type would not report using withdrawal or rhythm in the GLSS survey, however, and the figures reported here would slightly undercount effective contraception.

Table III presents knowledge, ever use and current use of any traditional and any modern method by socioeconomic characteristics of the women and their households. Current use of modern methods rises from 2 percent of women with no schooling to 16 percent among those with more than ten years. There is a monotonic increase in all measures of knowledge and use as woman's schooling increases. Comparison across age cohorts reveals a different pattern. Knowledge and use are lower for younger and older women. Use of traditional methods is highest for women between the ages of 20 and 30. For modern methods, ever and current use are highest among women between the ages of 25 and 35. Knowledge of modern methods is 75 percent in rural areas compared to 92 percent in urban areas and current use is 4 percent compared to 8 percent. Knowledge of traditional methods does not vary much across urban levels but use of traditional methods is lower in rural areas, 29 percent compared to 39 percent.

There are also noticeable differences across household characteristics. Knowledge and use of contraceptives increases dramatically with the schooling of the household head. There is a steady, but not dramatic, increase across annual per adult expenditure quartiles in all categories except current use of a modern method. Nine percent of the women in the highest expenditure quartile are currently using a modern method compared to only three percent in the lowest quartile. Finally, each measure of knowledge and use decreases as distance to family planning services increases.

Family Planning Services

As explained above, contraceptives, especially the pill and condoms, but also Depo-Provera and spermicide are widely available in towns throughout Ghana. The health and family planning facilities nearest to each group of households were surveyed in conjunction with the Ghana Living Standards Survey. The average distance to the nearest health facility offering family planning services is 6.1 miles, although for 16 percent of the women the distance is greater than 10 miles. Eighty-three percent of women can obtain contraceptives at the nearest pharmacy. When the two sources, pharmácies and health facilities, are considered together, a method of modern contraception is available within 10 miles for over 92 percent of the women. The mean distance is 3 miles.

Several characteristics of the surveyed health facilities and pharmacies are presented in Table IV. The nearest health facility offering family planning services is a public health facility in 76 percent of the sample clusters (77 percent of the women). Condoms, offered at 95 percent of the health facilities and 85 percent of the pharmacies, are the most widely available method. Spermicide and the pill are also widely available. In fact, pills are in stock in a greater percentage of facilities than condoms. Eighty-five percent of the health facilities offer Depo-Provera but it was in stock on the survey day for only 23 percent of facilities. The IUD is offered by 44 percent of the facilities, in stock in 41 percent. IUDs are available in facilities with personnel qualified to insert them in 39 percent of the facilities. Practical availability of Depo-Provera and IUDs also depends on the availability of medical equipment, such as syringes and specula, that was not covered by the survey.

Table III. Knowledge and Use of Traditional and Modern Contraceptives

(percent of women)

		Modern Methods			Traditional Methods		
	n	Knows	Ever Use	Current Use	Knows	Ever Use	Current Use
Woman's Years of Completed Schooling							
None	862	66	10	2	77	43	27
1- 6	376	91	24	7	87	49	30
7-10	722	95	45	10	86	60	39
Over 10	88	98	55	16	92	77	52
Woman's Age (in years)							
15-19	202	73	13	4	79	47	36
20-24	420	85	26	6	84	56	39
25-29	416	86	33	8	85	58	39
30-34	394	88	32	8	83	52	32
35-39	260	80	30	5	82	48	33
40-44	170	82	28	8	85	45	18
45-50	186	69	15	1	78	41	19
Current Residence							
Urban	654	92	37	8	85	59	39
Semi-Urban	399	85	29	8	84	50	34
Rural	995	75	19	4	81	47	29
Years of Completed Schooling of Household Head							
None	787	68	13	2	77	46	30
1- 6	265	84	17	4	84	47	27
7-10	811	92	37	9	86	55	35
Over 10	185	97	57	12	91	69	45
Per Adult Expenditure Quartiles							
Lowest	483	73	16	3	79	49	34
Second	499	81	21	6	78	47	29
Third	519	84	29	6	84	52	31
Highest	547	90	40	9	88	56	38
Miles to Nearest Health Facility with Family Planning							
0	580	92	39	11	88	58	37
1-3	514	89	29	6	83	57	37
4-8	449	72	17	3	80	48	33
Over 8	465	72	18	4	78	40	21

Source: Ghana Living Standards Survey, 1988-89.

Table IV. Characteristics of Nearest Health Facilities Offering Family Planning and Pharmacies

Characteristics	Health Facilities				Pharmacies
	Public n = 124	Private n = 28	Other n = 11	Total n = 163	n = 169
Percent of facilities offering:					
Condoms	100	79	82	95	85
Spermicide	97	68	64	90	75
Pills	98	82	73	94	75
IUD	42	50	55	44	1
Diaphragm	4	7	18	5	1
Depo-Provera	91	68	64	85	1
Any Modern Method	100	96	100	99	86
Mean number of methods offered	4.4	3.7	4.0	4.2	2.4
Percent with method in stock:					
Condoms	85	68	33	80	75
Spermicide	76	57	33	70	57
Pills	94	79	73	90	62
IUD	40	50	33	41	0
Diaphragm	1	0	9	1	0
Depo-Provera	85	61	36	23	1
Mean number methods in stock:	3.8	3.2	2.2	3.6	2.0
Mean price of methods offered (Cedis)[a]					
Condoms	4	10	7	5	17
Spermicide	16	23	33	13	73
Pills	19	103	29	33	60
IUD	99	296	100	209	50
Diaphragm	42	275	40	100	50
Depo-Provera	57	633	70	91	1125
Percent of facilities with:					
Outpatient Services	93	89	100	93	..
Deliveries	83	71	100	82	..
Pre-natal Services	94	79	100	92	..
Post-natal Services	85	71	100	84	..
Well-Baby Clinic	99	25	89	86	..
Malnour. Child Ser.	83	29	89	73	..
Immunizations	98	21	100	85	..
Anti-malarials	94	100	100	96	..
Antibiotics	77	79	100	79	..
Electricity	60	54	82	61	..
Refrigerator	82	43	82	75	..
Protected Water	64	75	55	65	..
Operating Room	28	39	73	33	..
Laboratory	41	29	73	41	..
At least one doctor	33	54	55	38	..

Continued on next page

Table IV *continued*

Characteristics	Health Facilities: Public n = 124	Private n = 28	Other n = 11	Total n = 163	Pharmacies n = 169
Percent of facilities that charge for					
Outpatient Service	86	85	56	85	..
average charge (Cedis)[b]	51	174	190	73	..
Family Planning consultation	12	29	9	15	..
average charge (Cedis)[b]	28	283	60	111	..
Mean number of:					
Doctors	1.1	1.1	2.3	1.1	..
Nurses	16.0	6.0	21.5	14.7	..
Midwives	4.4	3.0	8.7	4.4	..
Family Planning Workers	1.5	0.4	0.5	1.3	..
Female family planning staff	3.3	1.2	2.1	2.8	..
Beds	17.5	17.1	46.6	19.4	..
Years in Service	20.0	8.1	23.0	18.1	..

Source: Ghana Living Standard Survey, 1988-89.
a. Among facilities offering method.
b. Among facilities that charge.

All methods are offered and stocked in a higher percentage of public health facilities than private and other facilities. Private health facilities have higher "in stock" percentages. On average, 4.2 contraceptive methods are offered in health facilities and 2.4 methods in pharmacies. The number of methods in stock averages 3.6 and 2.0 for health facilities and pharmacies, respectively.

Charges for family planning services vary widely. Only 15 percent of the health facilities charge for family planning consultations. On the other hand, *all* facilities charge for the methods themselves. The fee for the pill ranges from 6 to 550 cedis per month.[8] The average price for a one-month supply of pills is 33 cedis in health facilities and 60 cedis in pharmacies. The per condom charge ranges from 0.2 to 50 cedis. Again, the average price in health facilities is less than one third of the average price in pharmacies. The average price of Depo-Provera is 91 cedis, but it can be as high as 1,125 cedis. The most expensive method, the IUD, costs 209 cedis on average and can cost as much as 2,500 cedis. Of course, the cost of the IUD is not recurrent. Pharmacies are the most expensive source of methods, followed by private health facilities.

8. In 1988 the end of period market exchange rate was 229.89 cedis = $1US. The average daily male wage for agricultural clearing work in rural areas was 312.5 cedis in 1988-1989 (GLSS).

The average number of staff at a family planning facility is 3.3. At least one doctor is on the family planning staff in 38 percent of the health facilities. Less than two percent of all facilities do not have a doctor, nurse, or midwife. There is at least one female on the staff of 85 percent of the facilities. The average family planning worker is 42 years old and has an average of 2.9 children. Three quarters of the health facilities offer the entire complement of child-related services: pre- and post-natal consultations, deliveries, well-baby clinics, malnourished child programs and immunizations.

Schooling and Health

In addition to availability, quality and price of family planning, interventions in other fields can be expected to affect the demand for contraception by affecting the demand for children. Two obvious fields are schooling and health. The interaction of public policy regarding family planning, schooling and health was recognized explicitly in the Ghana Population Policy. Scribner (1994) describes the policy interaction and details current policies in each sector in several Sub-Saharan African countries. Data for Ghana and Sub-Saharan Africa or other low income countries are compared in Table V.

Schooling, especially of women, is higher in Ghana than in most Sub-Saharan African countries. Female literacy has risen from 17 percent in 1960 to 51 percent in 1990—in contrast, the median figure for low income countries is 36 percent. A higher percent of the age group is enrolled in school at each level in Ghana than for Sub-Saharan African countries as a whole. Female secondary enrollment in Ghana (31 percent) is almost double the rate for Sub-Saharan Africa (16 percent). Expenditure per primary school student in Ghana rose through the 1970's and then dropped well below the average for low income countries during the economic crisis of the 1980's. The percent of government expenditure devoted to education has been higher in Ghana than the Sub-Saharan African average since 1975.

Access to schools is very high in Ghana. Ninety percent of the women in rural households live within two miles of a primary school and within five miles of a middle school. The mean distance to primary and middle schools in rural areas is 0.6 and 2.1 miles, respectively.

The infant mortality rate in 1990 was 83/1000, well below the 104 average for Sub-Saharan Africa (World Development Report, 1993). Under five mortality, wasting, and stunting are also below average though still high.

Clearly, Ghana is a country with a long-standing policy of encouraging family planning. A large majority of women know of modern and traditional contraceptive methods and some type of family planning services are located within 10 miles of more than 90 percent of women of childbearing age. In spite of the conducive atmosphere and relatively high availability, use of contraceptives, especially modern contraceptives remains low. The empirical work presented below will indicate the importance of availability, price and quality of services in determining use of family planning. The predicted effect on fertility rates of reducing the cost of using family planning can be compared to the effect of increasing school enrollment of girls. The next section describes the resolutions adopted in response to the issues that arose in the empirical work while the results are discussed in Section V.

Table V. Schooling and Health in Ghana and Sub-Saharan Africa

	Ghana	Sub-Saharan Africa	Low Income Countries
Schooling Statistics			
Percent Literate, 1990			
Total	60.3	47.3	
Male	70.0	59.0	
Female	51.0	36.1	
F/M Ratio	0.73	0.61	
Percent of Age Group Enrolled in School, 1990			
Primary, Total	75	68	
Primary, Female	67	61	
Secondary, Total	39	17	
Secondary, Female	31	16	
Tertiary, Total	2	2	
Primary Pupils/Teacher	29	41	
Public Recurrent Expenditure Per Student in Primary School, 1985 US Dollars			
1965	37.5		40.7
1970	45.5		40.8
1975	41.5		40.7
1980	16.0		29.4
1985	18.4		31.2
Expenditure on Teaching Materials Per Student, 1984			
Constant 1985 US Dollars	0.1		0.5
Percent of per capita GNP	0.03		0.23
Education as a Percent of Total Government Expenditure on Education			
1975	20.6		15.0
1980	22.0		12.7
1985	18.0		15.3
1988	25.7		..
Health Statistics			
Infant Mortality, 1991	83	104	
Under-5 Mortality, Female, 1991	122	167	
Under-5 Mortality, Male, 1991	140	186	
Maternal Mortality, 1988	1,000	686	
Population per Physician, 1990	22,970	23,540	
Crude Death Rate, 1991	12	16	

Sources: Percent literate, UNESCO, 1991; Enrollment rates, World Bank, 1993; Expenditure per student, Lockheed and Verspoor, 1991; Total government expenditure, IMF and Lockheed and Verspoor, 1991; Health statistics, World Bank, 1993.

IV. Empirical Issues

Estimation of the use of contraception raises several issues including the choice of dependent variable and the choice of independent variables. Especially important to this study is the choice of quality, price and accessibility measures. This section presents a detailed discussion of the data, these issues and their resolution. The variable descriptions and descriptive statistics are in Table VI.

Data

The empirical work is performed using data collected from the Ghana Living Standards Survey (GLSS) and an associated survey of the Health and Family Planning Facilities and Pharmacies nearest to the GLSS respondents. The 1988-89 round of the GLSS contains information on contraceptive use and other socioeconomic data for 2,136 women 15-50 years old.[9] The average age of the women in the sample is 28.8 years and the average age at first cohabitation is 17 years. Ninety-five percent of the women have cohabited by age 20, 17.2 percent have never been pregnant and 4.2 percent have been pregnant but have never given birth.

Sample

The sample will contain all women for whom there is a complete set of data. This implies the inclusion of some women who may have entered menopause. The 219 women in the sample who have never cohabited with a man were not asked the questions on contraceptive knowledge and use. They will be included in the estimates of use of modern methods as not currently using a modern method even though they are using the most effective method.[10] Women who are currently pregnant and those who have recently given birth are also included even though they are not candidates for family planning services, since to exclude them would be based on indicators of the demand for children, which is endogenous.

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9. The GLSS was conducted by the Ghana Statistical Service in association with the World Bank in 1988-89 and covered 3,192 households. The sample was drawn from households in rural, semi-urban and urban communities in all administrative regions of the country. Of the 3,192 households, 489 do not include any women and 356 households have no woman between age 15 and age 50. An additional 76 households include women of the appropriate age in the household roster, but there is no fertility data on them. There is no information on family planning services for 114 of the 2,271 women remaining. Individual variables are missing for 21 women. The resulting data set contains 2,136 women. No information on contraceptive use was collected for the 219 women who reported that they have never had sexual relations with a man. See World Bank, (1993b), for a more detailed description of this dataset.

10. They will also be included in the estimates of traditional use as current users. They were not included in the figures presented in Tables II and III.

Table VI. Variable Definitions, All Women (n = 2,136)

Variable Name		Mean	Standard Deviation
CMODUSE	Current use of a modern method	0.056	0.230
EVERUSE	Ever use of a modern method	0.241	0.428
CTRAUSE	Current use of a traditional method	0.388	0.487
Woman's Characteristics			
AGE	Woman's age, in years	28.802	9.230
AGE2	Woman's age squared	914.671	579.588
GRADE	Years of completed schooling	4.716	4.695
URBAN	Woman lives in Urban area	0.304	0.460
SEMIURB	Woman lives in Semi-Urban area	0.199	0.399
RURAL	Woman lives in Rural area	0.497	0.500
BIRTHURB	Woman born in an urban area	0.556	0.497
EXPEND	Estimated log per adult annual expenditure	4.851	0.274
PROTEST	Household head is Protestant	0.234	0.424
MUSLIM	Household head is Muslim	0.112	0.316
CATHOLIC	Household head is Catholic	0.173	0.378
OTHCHR	Household head is Other Christian	0.217	0.413
ANIMIST	Household head is Animist	0.214	0.410
OTHER	Household head is Other Religion	0.050	0.217
AKAN	Language of household head is Akan	0.507	0.500
Family Planning Facility Characteristics			
DISTANCE	Miles to nearest health facility w/FP	6.217	10.043
PUBLIC	Nearest facility with FP is public	0.816	0.388
FPFEE	Fee charged for FP consultation (Cedis)	19.860	74.485
PUB*FEE	Interaction, PUBLIC and FPFEE	3.394	10.666
SPERMICID	Does the nearest facility offer spermicide	0.903	0.296
SPPRICE	Price charged for spermicide	15.671	34.969
PUB*SPPR	Interaction, PUBLIC and SPPRICE	12.255	34.359
POSTNATAL	Does FP facility offer postnatal services	0.848	0.359
NUMMETHOD	Number of FP methods offered	4.157	0.999
FPSTAFF	Number of FP staff	3.347	2.107
FPFEM	Number of FP staff <36 yr <4 children	2.896	1.425
Pharmacy Characteristics			
DISTANCE	Miles to nearest pharmacy	2.088	3.696
SPOFFER	Spermicide offered	0.693	0.461
SPPRICE	Price of spermicide	49.084	95.289
CONDOM	Condoms offered	0.806	0.396
CONDPRICE	Price of condom	12.282	80.702
PILL	Pill offered	0.700	0.458
PILLPRICE	Price of pill	42.457	36.232
Nearest Health Facility Service Characteristics			
NFP	FP offered at nearest health facility	0.554	0.497
DISTANCE	Miles to nearest health facility	3.097	4.471
PUBLIC	Nearest facility is public	0.525	0.500
FPFEE	Fee charged for FP consultation	17.299	73.545
PUB*FEE	Interaction, PUBLIC and FPFEE	1.395	7.592
SPERMICID	Spermicide offered at the nearest facility	0.479	0.500
SPPRICE	Price charged for spermicide	9.489	26.462
PUB*SPPR	Interaction, PUBLIC and SPPRICE	7.280	25.538
POSTNATAL	Does facility offer postnatal services	0.618	0.486
NUMMETHOD	Number of FP methods offered	2.244	2.169
FPSTAFF	Number of FP staff	1.596	1.800
FPFEM	Number of FP staff <36 yr <4 children	1.432	1.615

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Dependent Variable

Potential measures of contraceptive use include ever use, current use and use in the last year, for each of twelve methods. Two decisions must be made: 1) whether to employ ever use or current use; and 2) whether to measure use of any method, modern methods as a group or individual methods.

With respect to the first choice, ever use is an attractive alternative because more women have used a modern method at some time than are currently using one. However, in order to address the question of the effect of facility availability and quality on contraceptive use, ever use may be less practical because fewer women can be linked to the quality of services available in the past; 41 percent of the women have lived in their current town of residence for five years or less. With current use it is possible to match the women to the facilities in their town of current residence.[11]

If raising prevalence of modern methods is the policy objective, then the case for using current use of modern contraception as the dependent variable is clear. The comparatively small number of women using contraception makes it impractical to estimate use of any method individually. However, it is conceivable that the presence of family planning facilities may contribute to a reduction in the demand for children and an increase in use of all methods, both modern and traditional.

Traditional methods are generally much less effective than modern methods; their effectiveness depends to a much greater extent on behavior modification. On the other hand, the financial obstacles to using traditional methods may be less difficult to overcome. The cost in time or money for modern methods may be too much in poor households. Adverse side effects are often expressed as reasons for not using modern methods; many of the traditional methods have fewer side effects (with the exception of accidental pregnancy). However, aside from the 219 women in the sample who report that they have never cohabited with a man, it is unlikely that the women who report that they are practicing abstinence or rhythm are using effective contraception. Several women who report that they are currently using abstinence also report current use of other methods such as condon s. Periodic abstinence is not likely to be an effective method. In the 1988 Ghana Demographic and Health Survey (GDHS) only half of the women who reported that they were using the rhythm method correctly identified the fertile period of the menstrual cycle (Ghana Statistical Service, 1989).

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11. It could be argued that women who have used a method in the last year should also be included. This would increase the number of women using a modern method to 181 from 126. However, there is still the possibility that the method was used when the respondent was not in her current residence and that she ceased using the method precisely because of costs of obtaining the method or the quality of services in her current place of residence.

Estimates of current use of modern contraceptives are presented below. Where the results differ significantly from the estimates of ever use of modern methods and current use of traditional methods, it is noted.

Explanatory Variables

The data collected in any survey provide a variety of measures more or less closely related to the variables of interest. There are a variety of measures in the data that could be used as proxies for household permanent income, including estimated annual household consumption expenditure, value of household durable goods owned, income and other asset measures as well as physical characteristics of the dwelling (size and materials).[12] The measure selected for this study is annual consumption expenditure. This measure includes expenditure on food, household goods and utilities, approximate value of home produced goods consumed, estimated use value of household-owned consumer durables and the imputed rental value of the household's dwelling. Because of potential endogeneity of fertility decisions to consumption level, per adult annual consumption expenditure is predicted using location and zone of residence and years of completed schooling of the household head. The predicted values are used in the regressions presented below.[13]

As a proxy for her wage, the woman's years of completed schooling are included. Schultz and Tansel (1993) find years of schooling in middle and secondary school to be positively related to women's wage in Ghana. Women's schooling may be related to contraceptive use for reasons other than as a proxy for her wage. Schooling effectively decreases the cost of obtaining information of contraception. Women's schooling levels are also correlated with men's schooling levels.[14]

To capture price differences, households will be divided into Urban, Semi-Urban, Rural according to the population of the town or village (population greater than 5000, between 1500 and 5000, less than 1500, respectively).

Tastes are controlled for by including dummy variables for the area of the woman's birth (large city, small city or large town). Religious affiliation and ethnic group often

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12. Grootaert (1993) discusses the implications of using the various measures of household economic status.

13. Marital status of the women and characteristics of the husband are intentionally not included among the explanatory variables because they are felt to represent decisions made by the woman that are jointly endogenous to the fertility and contraceptive use decisions. The same is true of other variables such as the number of surviving children, sex of children, and age of the youngest child, which are related to the demand for contraception but not exogenous to that decision.

14. Husbands' schooling has not been included in this analysis for the reasons mentioned above. In their study of contraceptive use across fourteen countries, however, Ainsworth and others (1994) found women's schooling to have a larger impact than husbands' schooling when they were both included in the sub-sample of married women in twelve of the countries studied.

influence tastes and will be controlled for in one specification. The majority of women belong to households headed by Christians. Twenty-four percent are Protestant, 17 percent Catholic and 22 percent Other Christian. Eleven percent of the households are headed by Muslims and 21 percent by Animists. The largest language group in Ghana is the Akan. They account for just over half of the women in the sample. The woman's age in years and age squared are included to control for differences in length of exposure to pregnancy.

The focus of this study is on the impact of price, quality and availability of contraceptives and family planning services on contraceptive use. Often, travel time is the important component of the cost of using contraception. The first family planning characteristic included is the distance, in miles,to the nearest health facility offering family planning. Dummy variables are included to control for whether or not the nearest health facility offering family planning is a public health facility and for whether or not spermicides are offered. The availability of spermicide is included because spermicide is one of the most commonly used methods. Controlling for the availability of other methods did not produce significant results.

The price variables used in the specifications below include the price of spermicide, the family planning consultation fee and the interaction of both fees with a dummy variable for whether or not the nearest source of family planning is public. Prices are available for several different contraceptive methods at both the nearest family planning facility and the nearest pharmacy or drug store. Since not all methods are available at all facilities, the creation of a price index is problematic. Correlation among the various prices is high and inclusion of more than one price can cause multicollinearity.

Quality aspects of family planning services that are felt to be important include the availability of other maternal and child health services, the availability of several methods, and the number of staff available to provide family planning. It is also hypothesized that female family planning personnel who have used contraception will raise the quality of services from the perspective of clients and that programs are more effective when they are offered in conjunction with other health and maternity services. The quality variables include: whether or not post-natal services are offered at the facilities, the number of methods offered, the number of family planning staff, and whether there is a woman under 35 with no more than three children on the family planning staff.

There are several potential difficulties associated with the interpretation of these quality variables. Health facility characteristics may not be important because health facilities are not the most common source of family planning. The three most popular methods are the pill, spermicide, and condoms. They are all available without prescription in pharmacies, and women report pharmacies and chemical sellers as the most common source for these three methods. Pharmacies are, on average, much closer to the women (1.2 compared to 6.2 miles). If travel is expensive and time consuming, then the higher pharmacy prices may be more than compensated for by the reduced distance.

A second difficulty arises because some of the most important aspects of quality cannot be controlled for in this analysis. Women report privacy and cleanliness of the facility, length of time spent waiting, and politeness of personnel as important aspects of quality. The measures of quality collected in the survey: availability of electricity, number of staff, hours of availability, etc. do not capture those characteristics. Also these measures proxy for size and location of the facility rather than simply the quality/efficiency of the facility.

In addition, where the appropriate measures are available, only a small fraction of facilities can be classified as being of "low quality". For example, only 3 percent of the women do not have a female staff member at the nearest family planning clinic. Only 7 percent are near facilities that offer fewer than three methods. Only 15 percent are near facilities that offer family planning but not the related post-natal services and all but 7 percent of women live near facilities that offer pre-natal services. Most of the women who are not using contraception are close to a facility that is not clearly lacking in any of the quality variables that have been measured.

A concern in the choice and use of all facility characteristics is that each of the quality, price and availability measures is not completely exogenous. There is a demand-induced aspect to a variable such as price of condoms. In a facility that receives virtually no requests for family planning, the method may be made available for free. Such a facility will not go to the trouble of stocking a method and then charging a high price for it if demand is low. For example, one aspect of quality that is felt to be important is whether the methods offered are actually in stock so that the necessity of a repeat trip is reduced. However, holding supplies constant, methods offered are more likely to be out of stock precisely where demand is high leading to perverse signs on the estimated coefficients (Mwabu and others, 1993). Thus, results must be interpreted with caution.

The health facility characteristics are presented for both the nearest facility and for the nearest facility offering family planning. The differential impact of the two sets of characteristics is discussed in Section V. Family planning methods are also available at many pharmacies. Availability of condoms, spermicides, and pills and the prices of each of these methods at the nearest pharmacy as well as the distance to that pharmacy are included in two of the specifications presented below.

V. Estimation Results

Logistic regressions with Huber standard errors are used to estimate the current use of modern contraception.[15] The results for specifications including the women's characteristics and various combinations of service availability, price and quality variables at the nearest health facility offering family planning are presented in Table VII. For each regression, three sets of numbers are presented. The first is the odds ratio coefficient, the second is the t-statistic for the null hypothesis that the coefficient is zero.[16,17] The third column is the marginal change in the probability of using contraception with respect to the independent variable calculated using the formula provided in the footnote to the respective table.

The first regression in Table VII presents a basic specification with only women's characteristics. Women's schooling has a significant positive effect on the probability of using modern contraception; at the mean, an extra year of schooling is associated with an increase of 0.3 percent in the probability of a current use of a modern method. This contrasts with many studies of fertility in which primary schooling is found to have an ambiguous effect on the number of children women have. When levels of schooling are controlled for separately, the effect of primary schooling on contraceptive use is unambiguously positive.

Women who are born in urban areas have estimated probability of using modern contraception two percentage points higher than other women. The inclusion of controls for both area of birth and current residence requires some additional attention. Table VIII below presents the combined effects of the place of birth and current residence coefficients. Women born in urban areas are more likely to use modern contraception than their rural-born counterparts regardless of place of current residence. The puzzle lies in the negative coefficient that applies to rural-born women who currently reside in urban areas. Empirical studies usually find that fertility is significantly lower and contraceptive use is significantly higher in urban areas. This is often interpreted as higher costs of child rearing in urban areas. Two possible explanations of these anomalous results are that rural-born women in urban areas are older, on average, than urban-born women in urban areas and that perhaps rural-born women face lower costs of child-rearing in spite of their current urban residence. The numbers in parentheses in Table VIII represent the number of women in each category.

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15. Huber's formula (Huber, 1967) is an asymptotic jackknife method of producing consistent standard errors when the observations in a dataset are clustered.

16. The odds ratio is defined as the probability of use divided by the probability of non-use (p/(1-p)). The odds ratio coefficients describe the change in the odds ratio with respect to a one-unit change in the explanatory variable, that is, d(p/(1-p))/dx. An odds ratio coefficient greater than one indicates that the explanatory variable raises contraceptive use, while a coefficient of less than one indicates that is lowers contraceptive use.

17. A t-statistic of 2.576 or larger indicates statistical significance at 0.01 or less; 1.960 indicates significance at 0.05; and 1.645 indicates significance at 0.10. The higher is the t-statistic, the more statistically significant is the result.

Table VII. Logistic Regressions of Current Use of a Modern Method on Characteristics of the Nearest Health Facility Offering Family Planning

	(1)			(2)			(3)			(4)			(5)		
	Odds Ratio	t	Marg Δ[1]	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ
Woman's Characteristics															
AGE	1.392	4.475	1.27	1.393	4.474	1.16	1.391	4.356	1.12	1.387	4.367	1.11	1.406	4.389	1.04
AGE2	0.995	-4.200	-0.02	0.995	-4.202	-0.02	0.995	-4.109	-0.02	0.995	-4.107	-0.02	0.995	-4.163	-0.02
GRADE	1.077	2.706	0.29	1.071	2.503	0.24	1.074	2.635	0.24	1.075	2.619	0.24	1.068	2.256	0.20
BIRTHURB	1.785	2.222	2.18	1.850	2.332	2.12	1.861	2.385	2.07	1.883	2.448	2.10	1.861	2.367	1.85
URBAN	0.658	-1.416	-1.45	0.414	-2.498	-2.76	0.438	-2.597	-2.48	0.457	-2.494	-2.33	0.585	-1.678	-1.51
SEMIURB	1.206	0.638	0.85	0.904	-0.317	-0.44	0.987	-0.045	-0.06	1.026	0.086	0.11	0.937	-0.211	-0.23
EXPEND	4.491	2.988	5.77	4.546	2.983	5.32	4.622	2.937	5.21	4.712	2.907	5.25	2.763	1.712	3.09
Characteristics of the Nearest Source of Family Planning															
DISTANCE				0.935	-2.162	-0.24	0.944	-1.988	-0.20	0.949	-1.831	-0.18	0.954	-1.614	-0.14
PUBLIC							0.451	-1.977	-3.49	0.485	-1.588	-3.07	0.519	-1.770	-2.46
FPFEE							1.000	-0.334	-0.00	0.999	-0.488	-0.00	0.999	-0.614	-0.00
PUB*FEE							0.983	-1.033	-0.06	0.984	-1.057	-0.05	0.977	-1.479	-0.07
SPERMICID							2.022	1.504	1.87	2.390	1.518	2.18	1.954	1.318	1.61
SPPRICE							0.972	-2.309	-0.10	0.972	-2.412	-0.10	0.975	-2.222	-0.08
PUB*SPPR							1.026	2.104	0.09	1.026	2.163	0.09	1.023	2.023	0.07
POSTNATAL										0.971	-0.080	-0.10	0.862	-0.433	-0.47
NUMMETHOD										0.969	-0.250	-0.11	1.028	0.232	0.09
FPSTAFF										1.121	1.972	0.39	1.201	2.657	0.56
FPWOMAN										0.841	-1.252	-0.59	0.721	-2.053	-1.00
Religion and Ethnicity of Household Head															
MUSLIM													0.798	-0.514	-0.17
CATHOLIC													0.719	-1.105	-0.11
OTHCHR													0.656	-1.469	-0.34
ANIMIST													1.085	0.229	0.04
OTHREL													0.688	-0.726	-0.23
AKAN													2.946	4.175	3.39
n	2136			2136			2136			2136			2136		
chi²(22)	82.26			91.20			102.61			104.63			127.38		
Pseudo R^2	0.0890			0.0987			0.1110			0.1132			0.1378		
Likelihood	-420.9397			-416.4665			-410.7652			-409.7516			-398.3758		

[1] The marginal change is the partial derivative of the probability of using modern contraceptives with respect to the independent variable. For continuous variables, it is calculated at the mean of all variables using the formula: $\frac{dp}{dx_k} = \frac{\exp(x\beta)}{[1 + \exp(x\beta)]^2} \cdot \beta_k$ calculated at variable means for continuous variables. For dichotomous explanatory variables, the formula is: $\Delta p = \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=1} - \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=0}$. The marginal changes displayed are multiplied by 100.

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Table VIII. Combined Coefficients on Current Residence and Area of Birth

CURRENT RESIDENCE	AREA OF BIRTH			
	Rural		Urban	
Rural	Comparison Group	(763)	2.2%	(299)
Semi-Urban	0.9%	(73)	3.0%	(351)
Urban	-1.5%	(113)	0.7%	(537)

Rural-born women represent only a small fraction of the women currently living in urban and semi-urban areas.

Predicted expenditure per adult has highly significant positive impact on the estimated probability of using modern contraception. An increase of consumption expenditure per adult of ten percent (12790 cedis) at the mean is associated with an increase in the probability of contraceptive use of 0.6 percent. The positive impact is not what was anticipated in the discussion of the model. In Ghana, women from households with higher per capita household expenditure are more likely to use modern contraception.

Specification 2 in Table VII presents the results when distance to the nearest family planning clinic is included. At the mean, an additional mile from a family planning source reduces the probability of using contraception by 0.2 percent from a mean of 5.62 percent. When distance is included, the negative effect of urban residence is more pronounced and more significant.

Price and availability of spermicide at the nearest family planning facility and other facility variables are included in specification 3. The coefficients on schooling, urban birth, current residence and expenditure are not affected by the inclusion of the facility variables. Predicted contraceptive use is significantly lower for women whose nearest family planning facility is a public health facility. The fee charged for family planning consultation has no significant effect on contraceptive use. The availability of spermicide has a positive but insignificant relation with contraceptive use. The price of spermicide has a significant negative effect. A ten cedi (66 percent) increase in the price of spermicide reduces the probability of contraceptive use by 1 percent.[18] The price of spermicide at public facilities has a significant positive impact. The combination of the two spermicide price coefficients, SPPRICE and PUB*SPPR results in no net effect of spermicide price in public facilities.

18. The price elasticity of the probability of using modern contraception calculated at the mean using the result in specification 3 is −0.28.

Specification 4 introduces four measures of facility quality. Only the number of family planning staff has a positive predicted effect on the probability of contraceptive use. In all, the low significance of quality coefficients is not surprising for the reasons discussed in Section IV above. The commonly used methods are more readily available in pharmacies and, the total number of women using modern contraception is low enough that it is unlikely that the only women that are not using contraception are those constrained by a lack of sufficient choice of method.

The final specification includes religion and language of household head variables. Protestant is the excluded religion and non-Akan is the excluded language. These results are presented because there are some differences in preferences across language and religion. The coefficient on Akan, is large and significant. Women in Akan households are 3.4 percent more likely to use modern contraceptive methods at the mean. It is true, however, that language and religion are correlated with the other individual and household characteristics and so the results are presented here with and without those controls. The coefficient on expenditure is reduced by half though it remains significant and positive. The effect of schooling and birth in an urban area are virtually unaffected by the introduction of the additional variables. The coefficients on the facility characteristics are somewhat more significant and larger.

After establishing these baseline results it is important to explore their robustness. First we relaxed the assumption on the choice of sample by repeating the analysis excluding women still in school and women currently pregnant. Excluding women still in school results in a slight increase in the coefficients on schooling and birth in an urban residence. Out of the 119 women currently in school, only 1 is currently using a modern method of contraception. Exclusion of the 231 currently pregnant women resulted in slight increases in magnitude and significance of the facility characteristics.

A variety of measures of woman's schooling can be included without any significant change in the other results. A quadratic specification indicates that years of schooling have a decreasing impact on the probability of contraceptive use. When dummy variables for level of schooling are included, women who continued beyond primary school are no more likely to use contraception than women with only primary schooling.

Facility characteristics for the nearest pharmacy and the nearest health facility (whether or not family planning is offered) are included in the regressions in Table IX. The effect of the price and availability and the price of the three methods at the pharmacy are positive and negative, respectively, although the coefficients are not significant. Specifications 2-4 in Table IX include availability, price and quality measures of the nearest health facility. Whether or not the facility offers family planning has a significant positive effect, women are 1.6 percent more likely to use a modern method. Distance to the facility has a negative impact, an increase in one mile reduces the probability of use by 0.3. The availability of spermicide at the nearest health facility increases the probability of using contraception by 3.0 percent. None of the quality measures are significant when all variables

are included. Specification 5 in Table IX includes both pharmacy and nearest health facility characteristics. Availability and price of spermicides in pharmacies are jointly significant and distance to the nearest health facility is significant.

Regressions of *ever use* of a modern method are presented in Table X. There are several notable differences between the estimates of ever use and current use. The effect of schooling and expenditure are much stronger on ever use. Birth in an urban area has no significant impact on ever use and the effect of current residence in an urban area is reduced. The negative effect of Catholic and Animist religion on ever use is significant, though the effect on current use was not significant.

Though distance to a family planning facility still has a significant coefficient, the predicted impact relative to the mean is much smaller for ever use than it was for current use. That the nearest health facility offering family planning is public has no significant impact on ever use. The reduced impact of availability on ever use is not surprising but the significance of the price coefficients is.

Also surprising, and difficult to explain are the coefficients on the quality variables. The signs of the coefficients in the ever use regression follow a pattern similar to that of the current use regression but they are significant in the explanation of ever use.

Table IX. Logistic Regression of Current Use of a Modern Method on Characteristics of the Nearest Pharmacy and Health Facility

	(1)			(2)			(3)			(4)			(5)		
	Odds Ratio	t	Marg Δ[1]	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ
Woman's Characteristics															
AGE	1.391	4.459	1.00	1.401	4.542	1.22	1.405	4.495	1.20	1.400	4.410	1.19	1.399	4.336	0.96
AGE2	0.995	-4.207	-0.02	0.995	-4.273	-0.02	0.995	-4.234	-0.02	0.995	-4.173	-0.02	0.995	-4.135	-0.02
GRADE	1.070	2.412	0.21	1.068	2.400	0.24	1.067	2.333	0.23	1.064	2.251	0.22	1.062	2.158	0.17
BIRTHURB	1.811	2.265	1.77	1.856	2.391	2.20	1.844	2.431	2.13	1.858	2.448	2.15	1.914	2.554	1.81
URBAN	0.586	-1.517	-1.46	0.452	-2.166	-2.58	0.445	-2.271	-2.53	0.448	-2.283	-2.50	0.450	-2.102	-2.01
SEMIURB	1.102	0.276	0.35	0.927	-0.208	-0.34	0.989	-0.032	-0.05	1.004	0.011	0.02	0.991	-0.023	-0.03
EXPEND	4.463	2.813	4.54	4.193	2.857	5.20	4.025	2.685	4.93	4.267	2.794	5.13	4.362	2.786	4.20
Characteristics of the Nearest Pharmacy															
DISTANCE	0.965	-0.802	-0.11										1.063	0.918	0.17
SPOFFER	1.579	1.151	1.28										1.806	1.402	1.53
SPPRICE	0.997	-1.045	-0.01										0.996	-1.406	-0.01
CONDOM	1.089	0.165	0.25										0.852	-0.281	-0.48
CONDPRICE	0.960	-1.262	-0.12										0.965	-1.076	-0.10
PILL	0.903	-0.239	-0.32										0.888	-0.241	-0.35
PILLPRICE	1.000	0.122	0.00										1.000	0.165	0.00
Characteristics of the Nearest Health Facility															
DISTANCE				0.918	-1.462	-0.31	0.916	-1.550	-0.31	0.917	-1.498	-0.31	0.874	-2.313	-0.38
FPOFFER				1.572	1.846	1.61	1.086	0.246	0.29	1.106	0.162	0.35	0.894	-0.178	-0.32
PUBLIC							0.620	-1.249	-1.73	0.645	-1.096	-1.58	0.680	-1.000	-1.11
FPFEE							1.000	-0.032	-0.00	1.000	-0.220	-0.00	1.000	-0.316	-0.00
PUB*FEE							0.991	-0.429	-0.03	0.990	-0.502	-0.03	0.992	-0.453	-0.02
SPERMICID							2.237	1.907	2.96	2.071	1.402	2.65	1.952	1.241	1.96
SPPRICE							0.989	-1.300	-0.04	0.989	-1.204	-0.04	0.995	-0.474	-0.02
PUB*SPPR							1.009	1.009	6.28	1.010	1.224	0.04	1.004	0.371	0.01
POSTNATAL										1.117	0.330	0.39	1.120	0.343	0.32
NUMMETHOD										1.059	0.367	0.20	1.080	0.478	0.22
FPSTAFF										0.857	-0.777	-0.54	0.843	-0.753	-0.49
FPWOMAN										1.058	0.271	0.20	1.152	0.578	0.40
n		2136			2136			2136			2136			2136	
$chi^2(22)$		88.77			92.10			98.20			99.66			106.58	
Pseudo R^2		0.0961			0.0997			0.1063			0.1078			0.1153	
Likelihood		-417.6816			-416.0159			-412.9671			-412.2371			-408.7774	

[1] The marginal change is the partial derivative of the probability of using modern contraceptives with respect to the independent variable. For continuous variables, it is calculated at the mean of all variables using the formula: $\frac{dp}{dx_k} = \frac{\exp(x\beta)}{[1 + \exp(x\beta)]^2} \cdot \beta_k$ calculated at variable means for continuous variables. For dichotomous explanatory variables, the formula is: $\Delta p = \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=1} - \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=0}$. The marginal changes displayed are multiplied by 100.

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Table X. Logistic Regressions of Ever Use of a Modern Method on Characteristics of the Nearest Health Facility Offering Family Planning

	(1)			(2)			(3)			(4)			(5)		
	Odds Ratio	t	Marg Δ[1]	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ
Woman's Characteristics															
AGE	1.393	7.414	5.14	1.394	7.427	5.11	1.394	7.457	5.10	1.393	7.567	5.07	1.408	7.760	5.12
AGE2	0.995	-6.587	-0.07	0.995	-6.610	-0.07	0.995	-6.662	-0.07	0.995	-6.752	-0.07	0.995	-6.990	-0.07
GRADE	1.126	8.661	1.84	1.123	8.469	1.78	1.126	8.272	1.82	1.128	8.263	1.84	1.117	7.508	1.65
BIRTHURB	1.080	0.548	1.19	1.089	0.615	1.31	1.090	0.621	1.31	1.113	0.777	1.64	1.061	0.423	0.89
URBAN	0.711	-1.758	-4.97	0.608	-2.443	-7.14	0.627	-2.377	-6.70	0.654	-2.254	-6.11	0.732	-1.673	-4.46
SEMIURB	1.187	0.814	2.93	1.080	0.367	1.32	1.082	0.384	1.34	1.079	0.383	1.27	1.047	0.241	0.74
EXPEND	9.259	6.424	34.56	9.199	6.519	34.17	9.546	6.452	34.61	10.162	6.854	35.44	7.345	5.636	29.83
Characteristics of the Nearest Source of Family Planning															
DISTANCE				0.980	-1.782	-0.32	0.982	-1.758	-0.28	0.987	-1.354	-0.20	0.995	-0.585	-0.08
PUBLIC							0.797	-0.827	-3.64	0.968	-0.101	-0.51	0.931	-0.222	-1.08
FPFEE							1.001	0.613	0.01	1.000	0.099	0.00	1.000	-0.049	-0.00
PUB*FEE							0.990	-2.023	-0.16	0.990	-1.985	-0.15	0.989	-2.196	-0.16
SPERMICID							1.039	0.127	0.57	1.472	1.050	5.35	1.446	0.970	5.01
SPPRICE							0.982	-2.364	-0.28	0.980	-2.537	-0.30	0.982	-2.426	-0.28
PUB*SPPR							1.016	1.993	18.96	1.017	2.122	20.55	1.016	2.085	19.86
POSTNATAL										0.935	-0.332	-1.04	0.931	-0.360	-1.09
NUMMETHOD										0.892	-1.276	-1.76	0.910	-1.011	-1.42
FPSTAFF										1.142	2.756	2.03	1.160	3.002	2.23
FPWOMAN										0.772	-2.461	-3.95	0.733	-3.061	-4.65
Religion and Ethnicity of Household Head															
MUSLIM													0.858	-0.806	-8.97
CATHOLIC													0.626	-2.683	-13.59
OTHCHR													0.826	-1.290	-9.56
ANIMIST													0.557	-2.865	-9.24
OTHREL													0.752	-0.969	-11.02
AKAN													1.495	2.979	6.00
n		2136			2136			2136			2136			2136	
chi²(22)		391.48			396.29			411.42			423.58			446.23	
Pseudo R^2		0.1661			0.1681			0.1745			0.1797			0.1893	
Likelihood		-982.9338			-980.5272			-972.9627			-966.8819			-955.5584	

[1] The marginal change is the partial derivative of the probability of using modern contraceptives with respect to the independent variable. For continuous variables, it is calculated at the mean of all variables using the formula: $\frac{dp}{dx_k} = \frac{\exp(x\beta)}{[1 + \exp(x\beta)]^2} \cdot \beta_k$ calculated at variable means for continuous variables. For dichotomous explanatory variables, the formula is: $\Delta p = \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=1} - \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=0}$. The marginal changes displayed are multiplied by 100.

Table XI shows estimates of the determinants of current use of a traditional method. Schooling has a larger estimated impact on current use of traditional methods than on current use of modern methods. A one year increase in schooling is associated with a 1.35 percent increase in use of traditional methods. Distance to a source of family planning is insignificant but some of the other price and quality measures are significant. The number of methods offered has a negative but insignificant association with use of traditional methods. The price of spermicides has a predicted significant negative impact on use of traditional methods.

There are potentially important differences in contraceptive use decisions between urban and rural areas and across age groups. Descriptive statistics for these sub-groups are presented in Table XII. Tables XIII and XIV show results for the determinants of current contraceptive use for rural and urban areas separately. There are striking differences between women currently residing in rural areas and those currently residing in urban and semi-urban areas.

In rural areas, schooling is a very important determinant of contraceptive use. Distance to family planning facilities has no predicted impact. On the other hand, public ownership of facility has a significant and large predicted impact on current use in rural areas. The price variables also have significant negative coefficients.

In sharp contrast, schooling has no significant impact in urban areas. Birth in an urban area and expenditure on the other hand have significant, positive impact on use of modern methods. The price of spermicide and the price of spermicide in public facilities are significant. The presence of a public facility in itself has no impact on current use in urban areas when quality variables are included. The coefficients on religion of household head are all insignificant but the coefficient on Akan remains significant.

Estimates of current use of modern method for three age groups of women are presented in the Tables XV-XVII. Schooling is not a significant determinant of contraceptive use for the younger women, but it has a significant positive effect on women between the ages of 25 and 34 years. Birth in an urban area is most significant for the youngest women. The level of household consumption expenditure has the most significant impact for women in the oldest age group. Catholic and Other Christian head of household has a somewhat significant negative impact for women under 25 years old but no impact on current use of contraception for older women.

The predicted impact of the availability, price and quality variables also varies across age groups. Distance to a family planning facility is only a significant determinant for women 25 to 34 years old. Public ownership of the facility is only significant for the youngest women. The price of spermicide is significant for all women but the quality variables are only significant for the women over 25 years old.

Table XI. Logistic Regressions of Current Use of a Traditional Method on the Characteristics of the Nearest Health Facility Offering Family Planning

	(1)			(2)			(3)			(4)			(5)		
	Odds Ratio	t	Marg Δ[1]	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ
Woman's Characteristics															
AGE	0.814	-5.565	-4.82	0.814	-5.570	-4.83	0.809	-5.653	-4.95	0.806	-5.727	-5.04	0.804	-5.814	-5.08
AGE2	1.002	3.955	0.05	1.002	3.955	0.05	1.002	4.043	0.05	1.002	4.133	0.06	1.002	4.207	0.06
GRADE	1.059	4.073	1.35	1.058	3.951	1.33	1.063	4.349	1.43	1.064	4.459	1.44	1.067	4.785	1.51
BIRTHURB	0.889	-0.922	-2.75	0.891	-0.918	-2.71	0.891	-0.927	-2.70	0.898	-0.874	-2.52	0.911	-0.753	-2.17
URBAN	1.718	2.218	12.82	1.656	1.980	11.96	1.758	2.430	13.38	1.797	2.582	13.92	1.707	2.337	12.66
SEMIURB	1.208	0.963	4.29	1.180	0.819	3.77	1.110	0.524	2.33	1.091	0.452	1.94	1.122	0.582	2.59
EXPEND	0.765	-0.692	-6.29	0.757	-0.716	-6.52	0.786	-0.628	-5.64	0.850	-0.417	-3.79	1.031	0.080	0.72
Characteristics of the Nearest Source of Family Planning															
DISTANCE				0.995	-0.503	-0.11	0.995	-0.513	-0.11	0.998	-0.219	-0.05	0.997	-0.354	-0.07
PUBLIC							0.839	-0.736	-4.15	0.947	-0.207	-1.27	0.922	-0.307	-1.91
FPFEE							1.000	0.315	0.01	1.000	-0.064	-0.00	1.000	-0.148	-0.00
PUB*FEE							1.007	1.340	0.15	1.007	1.394	0.16	1.008	1.745	0.19
SPERMICID							0.769	-1.437	-6.27	1.004	0.016	0.10	1.063	0.243	1.43
SPPRICE							0.980	-1.966	-0.47	0.979	-2.087	-0.49	0.979	-2.233	-0.51
PUB*SPPR							1.012	1.164	14.99	1.013	1.227	15.56	1.013	1.300	15.93
POSTNATAL										0.901	-0.354	-2.47	0.893	-0.388	-2.67
NUMMETHOD										0.896	-1.237	-2.56	0.880	-1.460	-2.98
FPSTAFF										1.099	1.136	2.20	1.091	1.076	2.04
FPWOMAN										0.849	-1.248	-3.83	0.865	-1.088	-3.38
Religion and Ethnicity of Household Head															
MUSLIM													1.019	0.092	8.53
CATHOLIC													0.820	-1.123	-3.42
OTHCHR													0.696	-2.489	-0.20
ANIMIST													1.016	0.079	5.21
OTHREL													0.802	-0.892	-2.93
AKAN													0.916	-0.597	-2.06
n	2136			2136			2136			2136			2136		
$chi^2(22)$	248.43			249.14			296.12			306.03			316.97		
Psuedo R^2	0.0871			0.0873			0.1038			0.1073			0.1111		
Likelihood	-1301.9531			-1301.595			-1278.104			-1273.1515			-1297.682		

[1] The marginal change is the partial derivative of the probability of using modern contraceptives with respect to the independent variable. For continuous variables, it is calculated at the mean of all variables using the formula: $\frac{dp}{dx_k} = \frac{\exp(x\beta)}{[1 + \exp(x\beta)]^2} \cdot \beta_k$ calculated at variable means for continuous variables. For dichotomous explanatory variables, the formula is: $\Delta p = \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=1} - \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=0}$. The marginal changes displayed are multiplied by 100.

Table XII. Variable Means and Standard Deviations by Residence and Age Group

Variable Name		Rural Women n = 1,062 Mean	Std.Dev.	Urban Women n = 1,074 Mean	Std.Dev.	Women 15-24 Yrs n = 785 Mean	Std. Dev.	Women 25-34 Yrs n = 769 Mean	Std.Dev.	Women 35-50 Yrs n = 582 Mean	Std.Dev.
CMODUSE	Current use of a modern method	0.039	0.193	0.074	0.261	0.041	0.198	0.078	0.268	0.048	0.214
Woman's Characteristics											
AGE	Woman's age, in years	28.426	9.286	29.173	9.163	19.517	2.854	28.962	2.835	41.112	4.808
AGE2	Woman's age squared	894.162	581.713	934.952	577.034	389.054	111.213	846.840	165.275	1713.249	404.258
GRADE	Years of completed schooling	3.452	4.115	5.966	4.896	5.224	4.467	5.346	4.765	3.198	4.570
BIRTHURB	Woman born in an urban area	0.282	0.450	0.827	0.379	0.541	0.499	0.572	0 495	0.553	0.498
URBAN	Household is in Urban Cluster	..	..	..	..	0.273	0.446	0.329	0.470	0.314	0.465
SEMIURB	Household is in Semi-Urban Cluster	..	..	0.395	0.489	0.200	0.400	0.196	0.398	0.199	0.400
EXPEND	Est. log per adult annual exp.	4.734	0.226	4.967	0.267	4.831	0.267	4.899	0.272	4.815	0.276
MUSLIM	Household head is Muslim	0.105	0.307	0.119	0.324	0.107	0.309	0.107	0.309	0.127	0.333
CATHOLIC	Household head is Catholic	0.155	0.362	0.190	0.392	0.152	0.359	0.195	0.397	0.172	0.378
OTHCHR	Household head is Oth Christian	0.181	0.385	0.253	0.435	0.215	0.411	0.226	0.419	0.208	0.406
ANIMIST	Household head is Animist	0.317	0.466	0.112	0.315	0.233	0.423	0.186	0.389	0.225	0.418
OTHER	Household head is Other Religion	0.056	0.231	0.043	0.203	0.043	0.204	0.052	0.222	0.055	0.228
AKAN	Language of head is Akan	0.442	0.497	0.573	0.495	0.518	0.500	0.521	0.500	0.474	0.500
Characteristics of the Nearest Source of Family Planning											
DISTANCE	Miles to nearest health fac. w/FP	10.076	12.538	2.400	3.989	6.329	9.781	5.848	9.353	6.553	11.207
PUBLIC	Nearest facility with FP public	0.870	0.336	0.762	0.426	0.827	0.379	0.805	0.397	0.814	0.389
FPFEE	Fee charged for FP consultation	8.738	31.844	30.857	98.959	19.274	70.693	19.922	74.533	20.567	79.368
PUB*FEE	Interaction, PUBLIC and FPFEE	2.928	10.089	3.855	11.194	3.745	11.316	3.420	10.477	2.887	9.987
SPERMICID	Spermicide at nearest facility	0.934	0.248	0.872	0.334	0.902	0.298	0.906	0.292	0.900	0.300
SPPRICE	Price charged for spermicide	11.859	14.218	19.440	46.953	15.674	34.235	16.579	39.828	14.466	28.507
PUB*SPPR	Interaction, PUBLIC and SPPRICE	9.508	13.276	14.972	46.474	12.441	33.582	13.113	39.468	10.872	27.464
POSTNATAL	FP facility offers postnatal care	0.856	0.351	0.841	0.366	0.848	0.359	0.843	0.364	0.856	0.352
NUMMETHOD	Number of FP methods offered	4.226	0.843	4.089	1.128	4.130	1.022	4.212	0.925	4.122	1.058
FPSTAFF	Number of FP staff	3.580	2.450	3.117	1.671	3.361	2.164	3.428	2.175	3.223	1.929
FPWOMAN	Women age < 36, children < 4	3.083	1.425	2.710	1.401	2.902	1.427	2.919	1.430	2.856	1.418

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Table XIII. Logistic Regression of Current Use of a Modern Method on Characteristics of Nearest Source of Family Planning, Rural Women

	(1)			(2)			(3)			(4)			(5)		
	Odds Ratio	t	Marg Δ[1]	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ
Woman's Characteristics															
AGE	1.405	2.470	0.92	1.404	2.441	0.83	1.379	2.358	0.71	1.381	2.355	0.69	1.457	2.448	0.70
AGE2	0.994	-2.348	-0.02	0.994	-2.324	-0.01	0.995	-2.285	-0.01	0.995	-2.242	-0.01	0.994	-2.356	-0.01
GRADE	1.143	2.677	0.36	1.133	2.475	0.31	1.134	2.556	0.28	1.143	2.660	0.28	1.119	2.166	0.21
BIRTHURB	1.215	0.507	0.55	1.287	0.647	0.66	1.332	0.774	0.68	1.418	0.947	0.81	1.481	1.011	0.80
EXPEND	2.049	0.809	1.93	2.301	0.911	2.05	2.444	1.029	1.98	2.100	0.782	1.59	0.798	-0.239	-0.42
Characteristics of the Nearest Source of Family Planning															
DISTANCE				0.957	-1.381	-0.11	0.968	-1.386	-0.07	0.978	-1.122	-0.05	0.990	-0.528	-0.02
PUBLIC							0.379	-1.183	-3.11	0.237	-1.703	-5.44	0.180	-2.247	-6.39
FPFEE							0.988	-1.697	-0.03	0.985	-2.149	-0.03	0.987	-2.261	-0.02
PUB*FEE							0.978	-0.766	-0.05	0.982	-0.607	-0.04	0.975	-0.684	-0.05
SPERMICID							0.842	-0.199	-0.41	1.006	0.007	0.01	0.623	-0.665	-1.08
SPPRICE							0.961	-1.444	-0.09	0.949	-1.847	-0.11	0.952	-1.813	-0.09
PUB*SPPR							1.003	0.087	2.75	1.019	0.557	0.04	1.033	1.026	0.06
POSTNATAL										2.057	1.308	1.23	1.450	0.761	0.61
NUMMETHOD										0.880	-0.454	-0.27	0.901	-0.362	-0.19
FPSTAFF										1.127	1.723	0.26	1.196	2.091	0.33
FPWOMAN										0.860	-0.657	-0.32	0.821	-0.795	-0.37
Religion and Ethnicity of Household Head															
MUSLIM													0.417	-1.243	-1.44
CATHOLIC													0.448	-1.296	-1.34
OTHCHR													0.455	-1.501	-1.32
ANIMIST													0.746	-0.547	-3.76
OTHREL													0.424	-1.407	-1.42
AKAN													3.403	2.429	2.58
n	1062			1062			1062			1062			1062		
chi²(22)	27.12			30.36			41.31			44.90			56.20		
Pseudo R^2	0.0781			0.0847			0.1190			0.1293			0.1618		
Likelihood	-160.0647			-158.4457			-152.9732			-151.1743			-145.5266		

[1] The marginal change is the partial derivative of the probability of using modern contraceptives with respect to the independent variable. For continuous variables, it is calculated at the mean of all variables using the formula: $\frac{dp}{dx_k} = \frac{\exp(x\beta)}{[1 + \exp(x\beta)]^2} \cdot \beta_k$ calculated at variable means for continuous variables. For dichotomous explanatory variables, the formula is: $\Delta p = \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=1} - \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=0}$. The marginal changes displayed are multiplied by 100.

Table XIV. Logistic Regression of Current Use of a Modern Method on Characteristics of Nearest Source of Family Planning, Urban and Semi-Urban Women

	(1)			(2)			(3)			(4)			(5)		
	Odds Ratio	t	Marg Δ[1]	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ
Woman's Characteristics															
AGE	1.410	3.832	1.68	1.418	3.888	1.62	1.426	3.787	1.55	1.421	3.771	1.53	1.413	3.592	1.38
AGE2	0.995	-3.535	-0.03	0.995	-3.588	-0.02	0.995	-3.500	-0.02	0.995	-3.498	-0.02	0.995	-3.337	-0.02
GRADE	1.036	1.134	0.17	1.032	1.042	0.15	1.033	1.083	0.14	1.032	1.007	0.14	1.028	0.834	0.11
BIRTHURB	4.176	2.553	4.87	3.988	2.465	4.50	4.065	2.424	4.29	4.075	2.426	4.26	4.018	2.402	3.88
SEMIURB	2.083	2.337	3.90	2.604	3.023	4.98	2.758	3.383	5.04	2.829	3.171	5.15	2.273	2.358	3.61
EXPEND	9.323	3.604	10.91	8.146	3.410	9.71	8.065	2.993	9.14	8.310	3.054	9.20	6.553	2.417	7.49
Characteristics of the Nearest Source of Family Planning															
DISTANCE				0.898	-1.361	-0.50	0.896	-1.456	-0.48	0.894	-1.360	-0.49	0.896	-1.439	-0.44
PUBLIC							0.419	-1.795	-4.77	0.455	-1.418	-4.19	0.577	-1.197	-2.52
FPFEE							0.999	-0.516	-0.00	0.999	-0.792	-0.01	0.998	-1.209	-0.01
PUB*FEE							0.988	-0.577	-0.05	0.986	-0.754	-0.06	0.980	-1.151	-0.08
SPERMICID							2.597	1.971	3.10	3.066	1.917	3.45	3.187	2.177	3.24
SPPRICE							0.971	-2.268	-0.13	0.969	-2.315	-0.14	0.971	-2.242	-0.12
PUB*SPPR							1.029	2.163	0.12	1.029	2.183	0.13	1.027	2.041	0.11
POSTNATAL										0.785	-0.490	-1.13	0.686	-0.836	-1.70
NUMMETHOD										0.992	-0.053	-0.03	1.036	0.249	0.14
FPSTAFF										1.042	0.323	0.18	1.287	1.827	2.00
FPWOMAN										0.882	-0.635	-0.54	0.612	-2.179	-1.96
Religion and Ethnicity of Household Head															
MUSLIM													1.361	0.571	2.69
CATHOLIC													0.945	-0.164	-1.06
OTHCHR													0.826	-0.553	-0.58
ANIMIST													1.335	0.569	2.66
OTHREL													0.827	-0.258	-0.58
AKAN													2.940	3.451	4.15
n		1074			1074			1074			1074			1074	
chi²(22)		53.04			58.29			67.10			67.91			79.98	
Pseudo R^2		0.0940			0.1033			0.1189			0.1203			0.1417	
Likelihood		-255.6644			-253.0409			-248.6359			-248.2299			-242.1965	

[1] The marginal change is the partial derivative of the probability of using modern contraceptives with respect to the independent variable. For continuous variables, it is calculated at the mean of all variables using the formula: $\frac{dp}{dx_k} = \frac{\exp(x\beta)}{[1 + \exp(x\beta)]^2} \cdot \beta_k$ calculated at variable means for continuous variables. For dichotomous explanatory variables, the formula is: $\Delta p = \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=1} - \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=0}$. The marginal changes displayed are multiplied by 100.

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Table XV. Logistic Regression of Current Use of a Modern Method on Characteristics of Nearest Source of Family Planning, Women under 25 years old

	(1)			(2)			(3)			(4)			(5)		
	Odds Ratio	t	Marg Δ[1]	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ
Woman's Characteristics															
AGE	35.301	2.517	7.89	37.772	2.552	7.79	36.551	2.549	7.30	33.082	2.532	6.88	35.696	2.507	5.22
AGE2	0.920	-2.394	-0.18	0.918	-2.430	-0.18	0.919	-2.423	-0.17	0.922	-2.385	-0.16	0.920	-2.341	-0.12
GRADE	1.019	0.331	0.04	1.018	0.314	0.04	1.019	0.322	0.04	1.028	0.466	0.05	1.008	0.116	0.01
BIRTHURB	2.299	1.788	1.83	2.414	1.809	1.88	2.468	1.842	1.82	2.506	1.955	1.80	2.898	2.233	1.55
URBAN	0.555	-1.232	-1.19	0.438	-1.426	-1.61	0.434	-1.486	-1.54	0.461	-1.468	-1.40	0.517	-1.329	-0.92
SEMIURB	0.860	-0.298	-0.37	0.738	-0.570	-0.74	0.727	-0.622	-0.74	0.718	-0.663	-0.73	0.645	-0.835	-0.68
EXPEND	6.329	1.784	4.08	6.386	1.787	3.98	6.680	1.721	3.85	6.459	1.677	3.67	7.810	1.731	3.00
Characteristics of the Nearest Source of Family Planning															
DISTANCE				0.974	-0.840	-0.06	0.975	-0.799	-0.05	0.980	-0.664	-0.04	0.987	-0.427	-0.02
PUBLIC							0.283	-1.703	-3.99	0.201	-1.710	-5.65	0.159	-1.985	-5.34
FPFEE							0.999	-0.414	-0.00	0.999	-0.225	-0.00	0.998	-0.547	-0.00
PUB*FEE							1.005	0.327	0.01	1.010	0.547	0.02	1.013	0.603	0.02
SPERMICID							3.863	1.244	1.74	6.369	1.301	2.01	6.537	1.347	1.50
SPPRICE							0.962	-1.909	-0.08	0.959	-2.010	-0.08	0.954	-2.150	-0.07
PUB*SPPR							1.039	1.857	0.08	1.042	1.900	0.08	1.048	2.105	0.07
POSTNATAL										0.988	-0.024	-0.02	1.032	0.062	0.05
NUMMETHOD										0.773	-1.006	-0.51	0.792	-0.870	-0.34
FPSTAFF										1.008	0.069	0.02	1.004	0.033	0.01
FPWOMAN										1.154	0.544	0.28	1.066	0.219	0.09
Religion and Ethnicity of Household Head															
MUSLIM													1.488	0.591	1.91
CATHOLIC													0.132	-1.870	-0.82
OTHCHR													0.405	-1.721	-0.26
ANIMIST													1.658	0.845	2.05
OTHREL													1.398	0.316	1.73
AKAN													2.618	1.569	1.43
n		785			785			785			785			785	
$chi^2(22)$		27.18			27.84			32.14			33.66			47.93	
Pseudo R^2		0.1016			0.1041			0.1202			0.1259			0.1792	
Likelihood		-120.1456			-119.8150			-117.6657			-116.9046			-109.7698	

[1] The marginal change is the partial derivative of the probability of using modern contraceptives with respect to the independent variable. For continuous variables, it is calculated at the mean of all variables using the formula: $\frac{dp}{dx_k} = \frac{\exp(x\beta)}{[1 + \exp(x\beta)]^2} \cdot \beta_k$ calculated at variable means for continuous variables. For dichotomous explanatory variables, the formula is: $\Delta p = \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=1} - \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=0}$. The marginal changes displayed are multiplied by 100.

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Table XVI. Logistic Regression of Current Use of a Modern Method on Characteristics of Nearest Source of Family Planning, Women 25 to 34 years old

	(1)			(2)			(3)			(4)			(5)		
	Odds Ratio	t	Marg Δ[1]	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ
Woman's Characteristics															
AGE	0.886	-0.094	-0.72	0.767	-0.202	-1.24	0.808	-0.164	-0.96	0.882	-0.094	-0.56	0.962	-0.027	-0.13
AGE2	1.002	0.083	0.01	1.004	0.183	0.02	1.003	0.147	0.01	1.002	0.072	0.01	1.000	-0.010	-0.00
GRADE	1.108	2.886	0.61	1.098	2.551	0.44	1.104	2.758	0.44	1.104	2.790	0.44	1.095	2.314	0.31
BIRTHURB	1.450	1.233	2.16	1.460	1.238	1.74	1.475	1.268	1.71	1.522	1.377	1.83	1.635	1.467	1.62
URBAN	0.701	-0.922	-1.84	0.308	-2.700	-4.78	0.338	-2.688	-4.13	0.369	-2.350	-3.77	0.531	-1.403	-1.96
SEMIURB	1.675	1.277	3.89	1.033	0.079	0.21	1.212	0.500	1.25	1.275	0.578	1.55	1.016	0.035	0.06
EXPEND	2.706	1.646	5.91	2.802	1.691	4.84	3.630	2.065	5.80	3.432	1.958	5.50	1.046	0.060	0.15
Characteristics of the Nearest Source of Family Planning															
DISTANCE				0.867	-2.616	-0.67	0.874	-2.492	-0.61	0.884	-2.211	-0.55	0.890	-2.162	-0.39
PUBLIC							0.413	-1.641	-5.18	0.494	-1.169	-3.87	0.534	-1.288	-2.56
FPFEE							0.997	-1.592	-0.01	0.996	-1.890	-0.02	0.996	-2.178	-0.01
PUB*FEE							0.986	-0.597	-0.06	0.985	-0.757	-0.07	0.972	-1.321	-0.09
SPERMICID							2.288	1.383	2.80	2.086	1.121	2.54	1.947	1.100	1.77
SPPRICE							0.967	-1.971	-0.15	0.965	-2.115	-0.16	0.966	-2.177	-0.12
PUB*SPPR							1.031	1.767	0.14	1.034	1.951	0.15	1.034	2.036	0.11
POSTNATAL										1.095	0.179	0.40	0.882	-0.246	-0.44
NUMMETHOD										1.228	1.066	0.92	1.387	1.654	1.10
FPSTAFF										1.101	1.106	0.43	1.285	2.735	0.85
FPWOMAN										0.760	-1.335	-1.22	0.573	-2.599	-1.88
Religion and Ethnicity of Household Head															
MUSLIM													0.288	-1.454	-4.91
CATHOLIC													0.844	-0.395	-2.02
OTHCHR													0.515	-1.610	-3.71
ANIMIST													0.614	-1.013	-11.05
OTHREL													0.708	-0.478	-2.71
AKAN													5.527	4.085	6.13
n		769			769			769			769			769	
$chi^2(22)$		27.85			40.69			46.72			49.78			74.26	
Pseudo R^2		0.0661			0.0966			0.1109			0.1182			0.1763	
Likelihood		-196.7169			-190.2975			-187.2829			-185.7492			-173.5111	

[1] The marginal change is the partial derivative of the probability of using modern contraceptives with respect to the independent variable. For continuous variables, it is calculated at the mean of all variables using the formula: $\frac{dp}{dx_k} = \frac{\exp(x\beta)}{[1 + \exp(x\beta)]^2} \cdot \beta_k$ calculated at variable means for continuous variables. For dichotomous explanatory variables, the formula is: $\Delta p = \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=1} - \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=0}$. The marginal changes displayed are multiplied by 100.

Table XVII. Logistic Regression of Current Use of a Modern Method on Characteristics of Nearest Source of Family Planning, Women 35 to 50 years old

	(1)			(2)			(3)			(4)			(5)		
	Odds Ratio	t	Marg Δ[1]	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ	Odds Ratio	t	Marg Δ
Woman's Characteristics															
AGE	22.574	2.740	6.78	22.676	2.737	6.44	28.680	2.548	6.45	27.580	2.476	5.84	51.690	2.982	6.56
AGE2	0.962	-2.783	-0.09	0.962	-2.779	-0.08	0.959	-2.587	-0.08	0.959	-2.510	-0.07	0.952	-3.006	-0.08
GRADE	1.081	1.683	0.17	1.077	1.593	0.15	1.091	1.591	0.17	1.085	1.395	0.14	1.084	1.275	0.13
BIRTHURB	2.174	1.373	1.66	2.202	1.397	1.60	2.293	1.461	1.57	2.452	1.498	1.55	2.532	1.362	1.52
URBAN	0.768	-0.496	-0.56	0.592	-0.948	-1.05	0.627	-0.850	-0.85	0.729	-0.536	-0.55	0.850	-0.240	-0.27
SEMIURB	0.902	-0.180	-0.24	0.772	-0.421	-0.58	0.867	-0.257	-0.30	0.810	-0.371	-0.38	0.875	-0.214	-0.23
EXPEND	8.043	2.194	4.54	8.063	2.141	4.31	4.341	1.413	2.82	4.878	1.313	2.79	4.669	1.168	2.56
Characteristics of the Nearest Source of Family Planning															
DISTANCE				0.964	-0.831	-0.08	0.971	-0.804	-0.06	0.984	-0.551	-0.03	0.995	-0.172	-0.01
PUBLIC							0.953	-0.084	-0.09	0.967	-0.053	-0.06	1.119	0.167	0.18
FPFEE							1.003	2.473	0.01	1.004	2.117	0.01	1.004	2.135	0.01
PUB*FEE							..	..	..	..	..	..	..	..	..
SPERMICID							1.468	0.617	0.64	3.324	1.547	1.40	2.012	0.909	0.90
SPPRICE							0.981	-1.476	-0.04	0.975	-2.058	-0.04	0.978	-1.781	-0.04
PUB*SPPR							-0.976	-0.898	-0.05	0.980	-0.768	-0.04	0.977	-0.841	-0.04
POSTNATAL										1.869	0.828	0.90	1.678	0.790	0.73
NUMMETHOD										0.731	-1.830	-0.55	0.738	-1.680	-0.50
FPSTAFF										1.335	2.337	0.51	1.473	2.676	0.64
FPWOMAN										0.749	-0.868	-0.51	0.656	-1.124	-0.70
Religion and Ethnicity of Household Head															
MUSLIM													1.833	0.806	1.56
CATHOLIC													0.831	-0.276	0.46
OTHCHR													2.456	1.112	2.24
ANIMIST													2.301	1.007	1.96
OTHREL													..	..	..
AKAN													2.436	1.464	1.56
n		582			582			527			527			497	
chi²(22)		35.26			35.86			45.51			49.35			56.02	
Pseudo R^2		0.1570			0.1597			0.2079			0.2255			0.2600	
Likelihood		-94.6440			-94.3448			-86.6690			-84.7497			-79.7231	

[1] The marginal change is the partial derivative of the probability of using modern contraceptives with respect to the independent variable. For continuous variables, it is calculated at the mean of all variables using the formula: $\frac{dp}{dx_k} = \frac{\exp(x\beta)}{[1 + \exp(x\beta)]^2} \cdot \beta_k$ calculated at variable means for continuous variables. For dichotomous explanatory variables, the formula is: $\Delta p = \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=1} - \exp(x\beta)/[1 + \exp(x\beta)] \mid_{x_k=0}$. The marginal changes displayed are multiplied by 100.

Drawing conclusions in the youngest and oldest groups is difficult because of the presence of women who are not cohabiting and women who have reached menopause. For the women who are most likely to be using contraception, those ages 25 to 34, both demand and supply factors are important determinants of contraceptive use. That is, both increases in schooling and increases in access to family planning would be expected to raise use of modern contraception.

Several patterns have emerged from the empirical work. The most striking is the strong positive effect of schooling for all women and for rural women. The effect of income on contraceptive use is positive and strong for all women and for urban women. Women from wealthier households are choosing to have fewer children. This is perhaps evidence of a quality-quantity trade-off, especially in urban areas. In spite of the relatively small distances to family planning sources, distance remains an important constraint, especially in urban areas. That this effect is stronger in urban areas may indicate higher demand. The availability of spermicides is consistently associated with higher use of contraception and the price exerts a negative effect from private facilities. On the other hand, the coefficients on the measures of quality are inconsistent and sometimes perverse. This result may reflect the lack of variability or that the variables that do not appropriately measure important quality aspects. It may also indicate that, at such low levels of contraceptive use, quality is not the binding constraint since many methods are available from most sources in Ghana.

Simulations

The results presented above describe several factors that are found to be significantly related to use of family planning. In order to compare the magnitude of the impact of various changes in public policy, the estimated change in probability of using a modern method associated with changes in independent variables are simulated. The results are presented in Table XVIII.

The mean probability of using a modern method of contraception is calculated using the estimated coefficients in Specification 4 of Table VII and Specification 5 of Table IX for all women. Predicted probabilities for each woman are recalculated for the value of the variable after the intervention. The mean probability of using a modern method is then recalculated. Increasing the schooling of each woman by one year would increase the predicted probability of using modern contraception from 5.6 to 6.0 percent. If every woman had at least a primary school education (an increase of 2.8 in the mean years of schooling), contraceptive use would rise to 6.3 percent. Reducing distance to health facility with family planning by one mile increases predicted use of family planning slightly to 5.8 percent. More drastic reductions in distance, to 0 or 5 miles, increase the probability to 6.8 percent and 6.1 percent, respectively. Increasing availability of spermicide at facilities offering family planning increases the predicted probability to 6.2 percent. Increasing the

Table XVIII. Simulated Impact on Contraceptive Use

Intervention	Change in Mean of Variable	Predicted Probability (Percent)
None	..	5.62
Women's Characteristics[a]		
Additional year of schooling	+1.00	5.99
Primary Schooling for all	+2.83	6.29
Per Adult Expenditure Increased by 10%	+0.10	6.40
Health Facility with Family Planning[a]		
Distance reduced by 1 mile	-0.72	5.78
Distance reduced to 0	-6.22	6.77
Distance reduced to 5 miles	-3.36	6.06
Distance reduced to 1 mile from 1-5 miles	-0.39	5.73
All Facilities Private	-0.82	9.13
Spermicide price reduced to zero	-15.67	9.04
Spermicide offered at all facilities	+0.10	6.21
Nearest Health Facility[b]		
Distance reduced by 1 mile	-0.58	5.93
Distance reduced to zero	-3.10	7.52
Distance reduced to 5 miles	-1.07	6.09
Distance reduced to 1 mile from 1-5 miles	-0.41	5.89
Nearest Pharmacy[b]		
Spermicide price reduced to zero	-49.08	6.59
Spermicide offered at all facilities	+0.31	6.63

[a] Predicted values calculated using regression results presented in Table VII, Specification 4.
[b] Predicted values calculated using regression results presented in Table IX, Specification 5.

availability of spermicide at health facilities and pharmacies increases use of contraception to 6.6 percent.[19]

The figures in Table XVIII indicate potential for significant changes in use of modern contraception. However, they would require substantial resources to realize. Also, they are only "partial" results, in the sense that they assume a change in one variable only, holding others constant. Clearly, increasing contraceptive use from any of the demand-side variables would require an increase in supply, and vice-versa. Analyzing the cost-effectiveness of alternative policy options requires consideration of the cost of the interventions. This is beyond the scope of this paper.

19. Price is assumed to be zero where spermicides are not currently available. Positive prices would temper the impact.

The Impact of Facility Characteristics on Fertility

Contraceptive use, in and of itself, is not the goal of most population policies. The focus of these policies is to lower fertility. While it is useful to know the importance of facility characteristics and socio-economic variables on contraceptive use, it is also useful to determine if these characteristics have the expected impact on fertility. Table XIX presents the results of OLS estimations of children ever born.[20] The regressions correspond to specification 4 of Table VII and specification 5 of Table IX. The first specification includes characteristics of the nearest health facility offering family planning and the second, characteristics of the nearest health facility and the nearest pharmacy.

As before, the significance and size of the impact of woman's schooling is striking. The impact of the facility characteristics on children ever born differs from the impact of those variables on contraceptive use. Distance to the nearest facility offering family planning has no significant impact on children ever born. The coefficients on the dummy variable for public facility, the fee, and the fee in public facilities, evaluated together indicate that women whose nearest family planning facility is private with high fees have the lowest fertility levels, while women whose nearest facility is public with high fees have the highest fertility. This counter-intuitive result may reflect the fact that a larger percentage of women in urban areas are closer to private facilities than in rural areas and that price of contraceptives may also reflect demand.

The availability of condoms at the nearest pharmacy has a significant negative impact on fertility. Women who live near pharmacies where condoms are available have predicted fertility 0.4 children lower than those who do not. In the estimations of contraceptive use, the availability of condoms had no significant impact. The lack of significance in the estimate of use may be due to the fact that less than twenty percent of women currently using a modern method of contraception use condoms. Availability of condoms at the nearest pharmacy may reflect community values that are consistent with lower fertility.

The distance to health facility is also significant, with a negative impact. This perverse result may be due to endogenous placement of facilities. The only other characteristic of the nearest health facility that is significant is the number of methods offered. Each additional method offered at the nearest health facility lowers the woman's predicted fertility by 0.1 child.

The estimated impacts of price, quality and availability of family planning services on fertility do not correspond precisely to the estimated impact of these variables on

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20. Children ever born is a standard measure of fertility used in the empirical literature on the determinants of fertility. For each woman, children ever born is the number of children to whom she has given birth, including those who have died. Age and the square of age will be included to control for the fact that, for most women, children ever born will not be completed fertility.

Table XIX. OLS Regressions of Children Ever Born on Characteristics of Facilities Offering Family Planning

	(1)		(2)	
	ß	t	ß	t
Woman's Characteristics				
AGE	0.381	10.169	0.384	10.423
AGE2	-0.002	-3.874	-0.002	-4.014
GRADE	-0.078	-8.091	-0.078	-7.888
BIRTHURB	0.093	0.861	0.121	1.133
URBAN	-0.565	-4.287	-0.665	-4.500
SEMIURB	-0.154	-1.002	-0.248	-1.670
EXPEND	38.925	3.307	38.247	3.127
EXPEND2	-1.648	-3.270	-1.620	-3.089
Characteristics of the Nearest Source of Family Planning				
DISTANCE	0.003	0.706		
PUBLIC	0.030	0.228		
FPFEE	-0.001	-2.030		
PUB*FEE	0.006	1.720		
SPERMICID	-0.199	-1.215		
SPPRICE	0.001	0.204		
PUB*SPPR	-0.001	-0.241		
POSTNATAL	0.014	0.119		
NUMMETHOD	-0.019	-0.405		
FPSTAFF	-0.036	-1.327		
FPWOMAN	0.036	0.701		
Characteristics of Nearest Pharmacy				
DISTANCE			0.010	0.671
SPOFFER			0.061	0.406
SPPRICE			-0.000	-0.439
CONDOM			-0.437	-1.989
CONDPRICE			0.001	0.989
PILL			0.233	1.021
PILLPRICE			0.001	0.332
Characteristics of the Nearest Health Facility				
DISTANCE			-0.022	-1.934
FPOFFER			0.194	0.961
PUBLIC			0.035	0.282
FPFEE			-0.001	-1.122
PUB*FEE			0.005	0.852
SPERMICIDE			0.019	0.090
SPPRICE			0.005	0.705
PUB*SPPRICE			-0.006	-0.775
POSTNATAL			0.107	1.013
NUMMETHOD			-0.101	-1.869
FPSTAFF			0.032	0.519
FPWOMAN			-0.009	-0.100
Constant	-233.98	-3.411	-229.966	-3.229
n	2136		2136	
Adjusted R^2	0.6153		0.6151	
Root MSE	1.7324		1.7624	

contraceptive use. The facility characteristics are not all significant in their impact on fertility. However, those that are significant, with the exception of distance to nearest health facility, have the expected signs. Their significance confirms that the impact of family planning facilities is not just on contraceptive use, but on fertility as well. The magnitude of the impacts reinforces the importance of reducing the demand for children, by increasing schooling of girls, for example, and thereby increasing the fertility reduction associated with contraceptive use.

VI. Conclusion

The results presented above underscore the importance of demand-side variables in contraceptive use. Schooling of women, household expenditure and urban birth significantly increase the probability of using modern contraception. The effect of these variables on contraceptive use is less ambiguous than their effect on fertility. As would be expected, at levels of usage as low as 6 percent, demand creation is important in increasing contraceptive prevalence.

The results indicate that a decrease in the average distance to a facility, currently 6.2 miles, would be expected to increase contraceptive use. However, pharmacies offer the methods most women use and are within 1.3 miles of women, on average. Also, interactions of schooling with distance to facility suggest that distance has a smaller negative impact as schooling increases. This is another argument in favor of focusing on demand-side variables.

The lack of clear significance of the quality of service variables should not be disheartening to family planning advocates. For the measures selected, variation in service quality does not account for variations in contraceptive use but this may simply indicate that quality is not the binding constraint. Where contraceptive use is so low, a large, multi-purpose cross-sectional survey does not include many users nor can it collect information on use in sufficient detail to explore the impact of quality. Understanding the impact of quality may be supplemented with focus group study or interviews that focus on women who are using contraception and those who have recently discontinued use. In Ghana, it seems, that the facilities are available and the measurable quality characteristics are, in general, high.

The survey does not specifically collect information on method effectiveness but the combinations of traditional methods that women said they were currently using (abstinence, rhythm, and douche for instance) indicate that effectiveness may be low. If this is the case, then increasing use of modern and more effective contraceptives among the 45 percent of urban women who are currently using a traditional method may result in a reduction in fertility at a lower cost than decreasing distance to family planning facilities in rural areas.

The low levels of contraceptive use in Ghana must reflect high demand for children. While the simulated impacts of some changes in family planning price, availability, and quality are striking, the entire impact should not be expected to be realized in the absence of any change in demand for children. Increases in schooling for girls, even at the primary level, would be an important component of any public policy designed to reduce population growth and limit dangerous pregnancies.

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